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Original Articles

The Feasibility of Prolonged Survival After Total Pelvic Exenteration for Advanced Cancer*

ALEXANDER BRUNSCHWIG, M.D., F.A.C.S., F.I.C.S. (HON.)**
NEW YORK

IN December 1946, I performed a one-stage excision of all pelvic viscera in order to relieve the marked discomfort of a woman who had extensive necroses of these viscera with recto-vaginal and vesicovaginal fistulas resulting from excessive reaction to irradiation given in the treatment of cancer of the vagina.[1] Both ureters were implanted into the sigmoid and the latter brought to form an end colostomy. The immediate recovery was satisfactory. On the thirty-fourth day the patient died suddenly, and necropsy revealed no evidence of carcinoma, peritonitis or hemorrhage. Death was ascribed to auricular thrombosis. Two additional patients were treated by similar procedures in January and March, 1947, respectively; the first of these died on the fifth postoperative day, of acute ascending pyelonephritis; the second was given satisfactory palliative treatment for several months and was able to leave her preoperative bedridden status and become fairly active. Death eventually occurred from carcinomatosis. Beginning in September 1947 an extensive and systematic

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**Attending Surgeon, Memorial Center for Cancer and Allied Diseases; Professor of Clinical Surgery, Cornell University Medical College.

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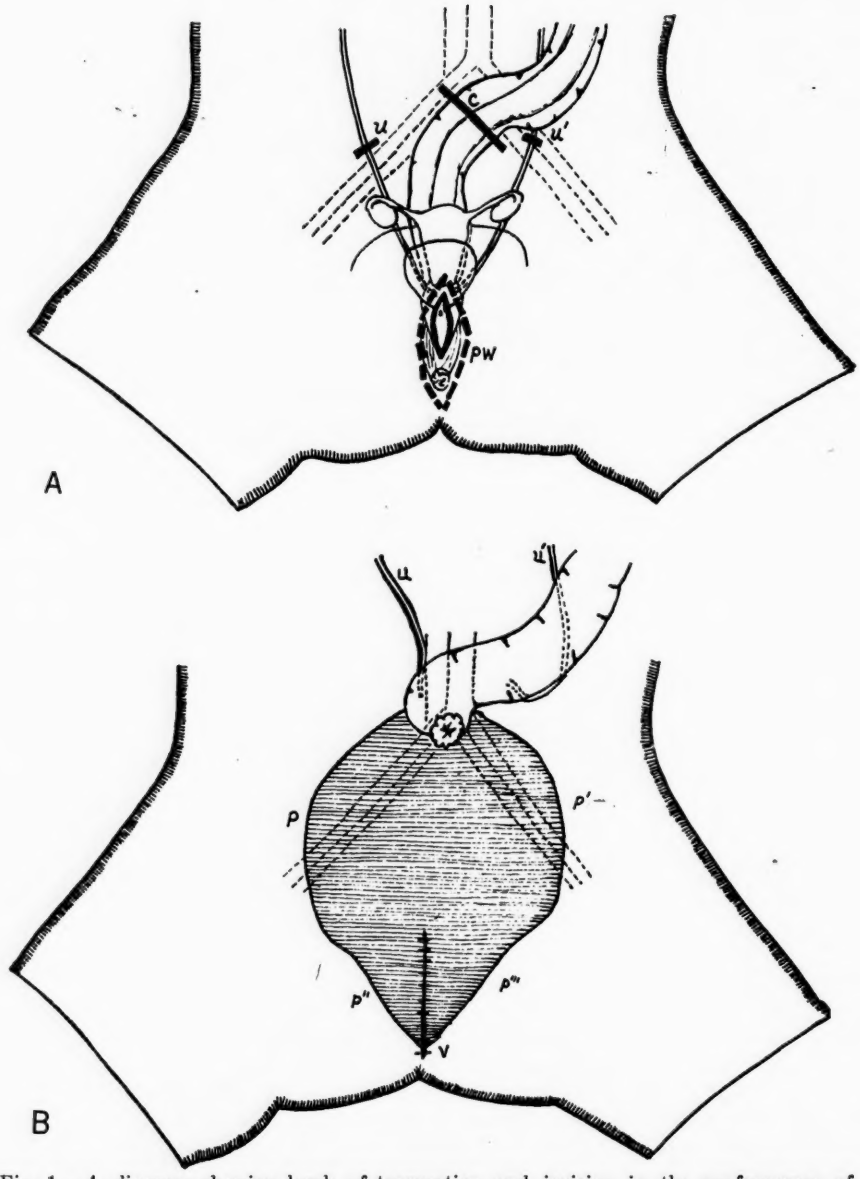

Fig. 1.—*A*, diagram showing levels of transection and incision in the performance of total resection of pelvic viscera. *U*, *U'*, levels of transection of right and left ureters respectively, near the external iliac vessels. Sometimes the ureters are transected lower. *C*, level of transection in region of upper pelvic colon. *PW*, elliptic incision performed at second stage which encompasses the vulva and anus. In younger women the clitoris and labia minora are left in situ. *B*, diagram showing conditions at end of operation for complete excision of pelvic viscera. Shaded area *P*, *P'*, *P''* indicates area of pelvis from which peritoneum has been stripped as well as pelvic viscera removed. The peritoneal stripping has extended above the level of the common and external iliac vessels. The midline colostomy is shown with *U*, *U'*, both ureters implanted into the colon a short distance above colostomy. Reproduced from *Cancer* (Vol. 1, p. 177, 1948) Paul B. Hoeber, Inc.

trial of the complete exenteration procedure was carried out. All patients coming to the Gynecological Clinic of the Memorial Center in New York, as well as private patients on my own service, who had extensive pelvic cancer involving the three principal viscera (the bladder, the female genital tract and the pelvic portion of the colon) and who showed no evidence of lymph node spread beyond the pelvis, were subjected to the operation. The large majority of these patients had been treated previously with irradiation therapy and/or some type of hysterectomy.

Palliation was the only objective envisaged, and the exenteration procedures were considered to be in the same category as chordotomy and lobotomy, i.e., attempts to facilitate increased comfort during the short survival period that was anticipated.

Over 140 complete pelvic exenterations and over 60 partial pelvic exenterations (leaving the rectum) have been carried out in a series of patients in which selection was minimal. Indeed, by the very nature of the program, the most unfavorable conditions rather than the favorable ones were selected.

The object of this report is to cite instances in which survival has not been for brief periods, as anticipated at the onset of the program, but for prolonged periods—indeed, for the conventional five-year period—in full general activity.

The technic of total pelvic exenteration has been previously described in some detail[2] (Fig. 1). In principle, it consists of removing en masse all pelvic viscera, including the bladder, the vagina, the rectal and lower sigmoid portions of the colon, high transection of the ureters and their implantation into the proximal sigmoid portion of the colon above the terminal colostomy (wet colostomy). The fatty tissues and pelvic lymph nodes are likewise removed *en bloc* with the pelvic viscera. The pelvic peritoneum is widely removed, and the remaining raw surfaces are left bare. No reperitonealization is carried out, because there is lack of peritoneum for this purpose. No untoward results have been observed as a result of failure to reperitonealize.[3]

Partial pelvic exenteration consists of removal of the bladder, the vagina, the uterus, the adnexae and the pelvic lymph nodes and areolar tissues. The ureters are implanted into the intact rectal portion of the colon. In this situation the patients control urinary and fecal excretion by means of the anal sphincter apparatus, and do not have ostomies.

REPORT OF CASES

CASE 1.—Z. A., a woman 65 years of age, was first seen on June 25, 1948. There was a large neoplastic ulceration replacing the cervix and extending downward on the anterior vaginal wall. Biopsy revealed epidermoid carcinoma. Roentgen irradiation was given by means of transvaginal cones to three portals 3 cm. in diameter. A total dose of 2,250 roentgen units was given to each of the three ports—one directly into the cervix and one to each parametrial port. There was appreciable regression of the lesion. The treatments were given from July 7 to Aug. 6, 1948. By August 11 induration was felt in both parametria. On September 14 a partial pelvic exenteration (bladder, vagina, uterus, etc.) was carried out, with implantation of both ureters into the intact colon. During convalescence there was a period of cardiac irregularity, which responded to proper medication.

The pathologic report read: "Epidermoid carcinoma of the cervix and necrosis of the posterior wall of the urinary bladder."

After discharge from the hospital, on the eighteenth postoperative day, the patient gradually resumed full activities suitable to her age. There were no episodes of pyelonephritis. In January 1952 she was readmitted for repair of an incisional hernia, and at this time inspection of the pelvis, the peri-aortic nodes, and the abdominal cavity in general failed to reveal any evidence of recurrent or metastatic disease.

By September 1952 she was well and without complaints. At the time of writing, four years after the operation, she is 69 years of age.

CASE 2.—T. G., a 34-year-old Negress, was admitted to the hospital on July 21, 1947, complaining of a bloody vaginal discharge.

Fig. 2.—Photograph of specimen in Case 4, consisting of pelvic viscera with recurrent carcinoma of cervix. The bladder, *BB'*, and the vagina, *VV'*, have been divided in the midline. *C*, recurrent carcinoma invading rectal colon and extending into base of bladder. The patient previously underwent a total hysterectomy and irradiation therapy for the primary lesion. Living and well four years and six months after the operation.

Two years earlier a supracervical hysterectomy was done elsewhere and four months thereafter an intermittent bloody discharge developed and had persisted. Pelvic examination disclosed an ulceration on the cervix with extension onto the anterior fornix. Biopsy revealed squamous cell carcinoma. Irradiation therapy was administered between July 28 and August 28, 1947. This consisted of four pelvic portals 14 by 14 cm., 200 kilovolts, 30 milliamperes, with filtration of 0.5 mm. of copper and 1 mm. of aluminum, at a total dose of 2,000 roentgens per portal was given. In addition, three intravaginal portals, one central and two parametrial, each 3.5 cm. in diameter, were given 250 kilovolts, with filtration of 1.5 cm. of aluminum, a total dose of 4,500 roentgens to each portal.

During the fall of 1947 various complaints referable to the pelvis were present; she was seen by me at this time, and a partial pelvic exenteration was advised. This was carried out on December 11. The ureters were implanted into the pelvic portion of the colon. The cervical stump and the pelvic lymph nodes, together with the bladder, were removed.

The pathologic diagnosis was epidermoid carcinoma of the cervix extending into the anterior vaginal wall, into the dome of cervical stump and into the bladder mucosa; the pelvic nodes were normal.

Convalescence was uneventful. The patient was discharged on the twenty-eighth day after the operation.

This patient presents a rather difficult psychoneurotic problem. She was a very unhappy woman before the operation and has been generally unhappy most of the time since, complaining especially of the necessity for frequent emptying of the colon during the day and of the fact that at night she frequently has to go to the bathroom. Examination, however, reveals a very tight rectal sphincter, so that, if it is necessary for her to empty her colon as often as she says it is, it is not because of lack of control. At times she admits she is quite well and happy. Much of her unhappiness may be ascribed to difficult social conditions; her feeling of great frustration at being incapable of sexual activity (although when a vaginoplastic operation was suggested it was most emphatically rejected with the statement that such things were "farthest from her mind"); the fact that her sister, with whom she lived, was hospitalized for pulmonary tuberculosis, etc. Again, on the objective and credit side of the situation are the facts that (1) she is proud and meticulous, within her meager economic means, of her personal appearance, and (2) her weight has increased from 90 pounds (40.8 Kg.) on Feb. 25, 1948, to 118 pounds (53.5 Kg.) at the time of writing.

During the four years and nine months since the operation there have been two attacks of acute abdominal pain, chills and rises in temperature, which are interpreted as attacks of ascending pyelonephritis. These occurred from Jan. 23 to Feb. 10, 1948, and July 19 to 25, 1951. Each time the symptoms subsided as a result of antibiotic therapy. By June 15, 1951, a staghorn calculus appeared in the right inferior calyx. In September 1952, four years and nine months after operation, there is no evidence of recurrences or metastases, and the patient is normally active.

CASE 3.—C. R., a woman aged 36, sought advice in September 1946 that would enable her to carry a fetus to term, as she had had five miscarriages. A lesion of the cervix was discovered; biopsy was performed and revealed carcinoma. Sixty roentgen treatments were given, and in April 1947 radium applications to the cervix were employed. This was repeated in June. In March 1948 the pa-

tient was readmitted to the hospital where she had received her radium treatments and was told there was no cure for her illness. She was discharged and at home had several severe vaginal hemorrhages. She was taken to a home for terminal care but signed out,

Fig. 3.—Photograph of patient C.W. (Case 4) four years and six months after complete pelvic exenteration. She has gained 80 pounds (36.3 Kg.) and is fully adjusted to the wet colostomy. Specimen from patient shown in Fig. 2.

coming to the Memorial Hospital to offer herself for "experimentation." She was admitted on May 26, and a complete pelvic exenteration was performed on June 3.

The pathologic diagnosis was epidermoid carcinoma of the cervix extending into the left parametrium and the base of the bladder, with direct extension onto the serosa of the pelvic portion of the colon opposite the cervix. Pyometria was present. The pelvic lymph nodes were normal.

Convalescence was uneventful except for episodes of elevated temperature and costovertebral tenderness (pyelitis). On July 2 the wet colostomy was revised, and on July 6 the patient was discharged, weighing 83 pounds (37.6 Kg.). By November she had gained 13 pounds (5.9 Kg.). On July 23, 1950, she was readmitted to the hospital, and a second plastic operation performed for prolapsed colon mucosa through the wet colostomy. By June she had gained 35 pounds (15.9 Kg.). At the time of writing she does work of various types on the outside. On August 15, 1952, four years and two months after the operation, there was no evidence of recurrences or metastases.

CASE 4.—C. W., a woman aged 45, a tertipara, was admitted to the hospital on May 28, 1947. In the fall of 1946 low back pain had developed, radiating to both thighs. On January 14 a total hysterectomy was performed for "a fibroid and a small cancer." This was followed by cycles of pelvic roentgen therapy, also in another institution, dosage unknown, for six weeks. Pain returned three months after the operation. Codeine was prescribed for the pain. On the patient's admission to the Memorial Center a fungating craterlike ulcer was present in the vault of the vagina, a biopsy of which showed recurrent epidermoid carcinoma of the cervix. Roentgen therapy was prescribed and given from June 2 to July 21. Six pelvic portals 14 by 14 cm., 200 kilovolts, 30 milliamperes, 0.5 mm. copper and 1 mm. aluminum filter, 70 cm. focal skin distance. A total dosage of 1,000 roentgens to two portals, 1,750 to two portals, and 2,000 to two portals was given. Then three intravaginal portals 3.5 cm. in diameter, one central and two parametrial, were employed to a total dose of 5,000 roentgens to two and 4,500 to one, was received. The factors were 250 kilovolts, 30 milliamperes, 1.5 mm. copper plus aluminum, focal skin distance. 55 cm.

Limited symptomatic relief was obtained. The patient was first seen by me in Jan-

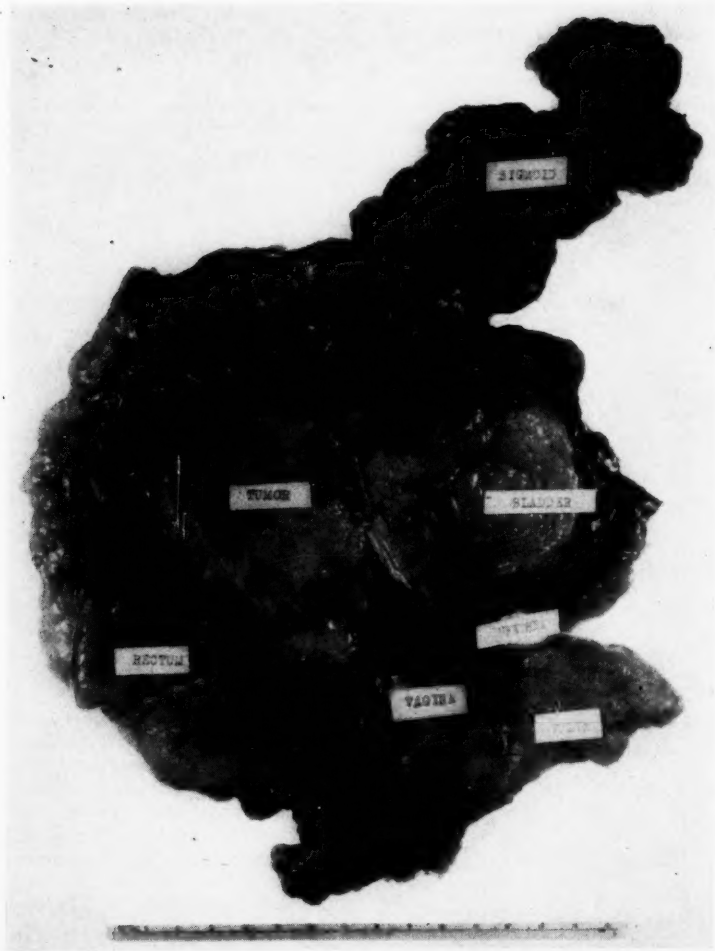

Fig. 5 (Case 6).—Photograph of specimen from complete pelvic exenteration performed for recurrent carcinoma of corpus uteri invading bladder and rectum. The patient has survived five years after the operation and is clinically well.

uary 1948. Pelvic examination revealed a fungating lesion involving the fundus of the vagina, with extensive invasion through the rectal wall and obvious extension into the base of the bladder.

A total pelvic exenteration was performed on February 26 by the resident surgeon on the service, Dr. Thomas Walsh, assisted by Dr. Virginia K. Pierce, then Special Fellow in Gynecology, and Dr. Borowicz of the resident staff. Convalescence was moderately stormy; there were transfusion reactions, thrombophlebitis (left leg), possible pulmonary infarction, avitaminosis, and a cutaneous reaction of unknown cause. The patient was discharged on the forty-first day after operation.

The pathologic study confirmed the presence of extensive recurrent carcinoma at the site of the previously removed uterus, with fungations into the rectum and invasion of the bladder base—epidermoid carcinoma (Fig. 2).

The patient was readmitted to the hospital on April 28 and discharged on May 5,

because of clinical signs and symptoms suggesting intestinal obstruction. Under conservative management the symptoms subsided, and there has been no recurrence. During the ensuing months general improvement was marked. Eventually the patient gained 80 pounds (36.3 Kg.) and became very active as a laundry sorter, as a practical nurse, in a factory, and in caring for her grandchildren. She has a full normal zest for life. At the time of writing, four years and seven months after the operation, there is no evidence of recurrences or metastases (Fig. 3). Pyelograms, taken four years and six months after the operation, show moderate bilateral hydronephrosis, but the blood urea nitrogen level has consistently remained within normal limits (Fig. 4).

CASE 5.—M. B., a tertipara 29 years old, was admitted to the hospital on Feb. 19, 1946. Dysmenorrhea had been present for one year; six months previously, one episode of severe vaginal bleeding had followed a foul-smelling vaginal discharge. Pelvic examination revealed a fungating lesion involving the cervix. Biopsy showed epidermoid carcinoma. Between February and March the patient received roentgen therapy to four pelvic portals, one anterior and one posterior, measuring 14 by 19 cm., and two lateral ones 14 by 11 cm. The factors were 250 kilovolts, 30 ma., ½ mm. Cu. + 1 mm. Al. filter, focal skin distance 80 cm. A total dose of 2,000 roentgens was given to each portal. This was promptly followed by vaginal cone therapy; three 3 cm. circular ports, one directly to the vagina and one to each paracervical region. The factors were 130 Kv., 5 ma., 0.1 mm. brass and 0.25 mm. Al. filters; focal skin distance 25 cm. 750 r per treatment. A total dose of 3,750 roentgens measured in air was delivered. On May 7, 1946, a "radium tandem" was inserted into the cervix, delivering a total dose of 4,880 mg. hrs. By July there was no symptomatic improvement, but pelvic examination revealed extensive induration in all directions. The clinical impression by October was recurrence of carcinoma. A biopsy confirmed this impression. Accordingly the patient was readmitted to the hospital and radium needles were inserted into the cervix and paracervical tissues for a total dosage of 2,880 milligram hours. Pain, vaginal discharge and general nutritional deterioration continued; the patient finally became bedridden, cachectic and addicted to morphine.

She was first seen by me on Sept. 22, 1947. Her weight had fallen to 90 pounds (40.8 Kg.)—20 pounds (9.1 Kg.) less than it had been prior to her illness. Pelvic examination revealed a "frozen pelvis." The cervix was not identifiable, but in its place was an irregular ulcer. A vesicovaginal fistula was present. The lower rectal portion of the colon was indurated and rigid. The patient com-

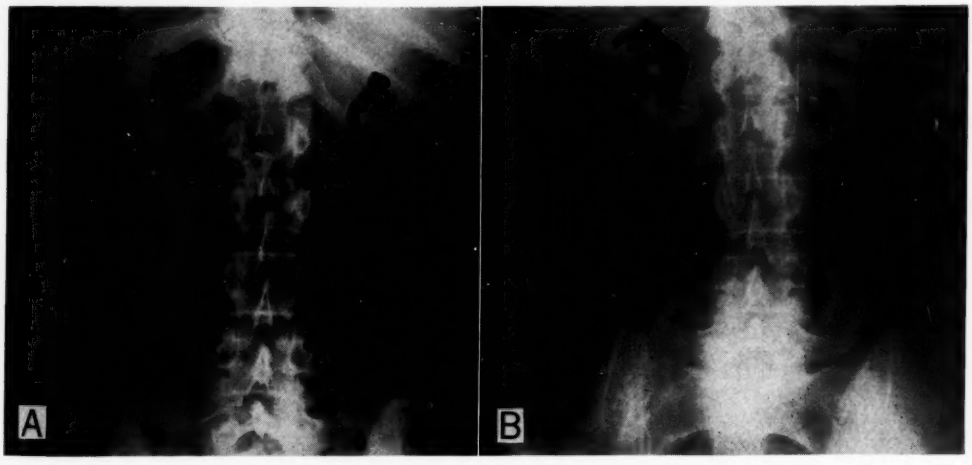

Fig. 4.—Photoroentgenograms showing intravenous pyelograms (retouched) in case 4, taken (*A*) Jan. 22, 1948, before total pelvic exenteration, and (*B*) July 23, 1952, four years and six months after complete pelvic exenteration. A moderate degree of hydronephrosis is present. The ureters were implanted into the colon proximal to the end colostomy (wet colostomy).

Fig. 6.—Photograph of M.S. (Case 6) five years after total pelvic exenteration for recurrent carcinoma of corpus invading bladder and rectum. Patient is fully adjusted to the wet colostomy and is very active physically. Her nutritional status is excellent.

plained bitterly of continuous pelvic pain radiating down the legs.

Total pelvic exenteration was advised and carried out on Oct. 9. Convalescence was not too stormy, and the patient was discharged with a well-functioning wet colostomy on the thirtieth post-operative day, weighing 88 pounds (39.9 Kg.).

Pathologic study of the specimen was admittedly not as thorough as it might have been. Routine blocks of tissue were taken but showed only marked irradiation changes, vesicovaginal fistula, and extensive irradiation proctitis. This failure to carry out detailed studies was no doubt due to the fact that both clinically and pathologically (gross) the situation appeared as though considerable carcinomatous tissue were present, and so when the routine blocks were taken the whole mass of pelvic viscera was discarded; "recuts" could not be made.

The patient's postoperative course was satisfactory. The postoperative difficulties were mainly psychological, but a good measure of readjustment has been possible. Interestingly enough, a strong libido has finally developed, and the construction of an artificial vagina is contemplated. The difficulties with the wet colostomy have been: some measure of difficulty in always keeping the wet colostomy bag glued to the skin; cutaneous irritation about the colostomy bud; cicatricial stenosis of the bud; epithelial excrescences about the colostomy bud which have become painful and were relieved by chemical and thermal cauterizations. However, on the strictly objective and credit side of the situation are the facts that (1) the patient has gained over 60 pounds (27.2 Kg.) since the operation (89 to 154 pounds, or 40.4 to 69.9 Kg.; (2) that she has a zest for life, and (3) that she indulges in full normal activities, e.g., doing all the heavy housework to maintain a five-room apartment, caring for her three children, going to parties and dances, and eating and drinking normally.

CASE 6.—M. S., a woman aged 56, was admitted to the hospital on Aug. 7, 1947. In July 1946 a biopsy diagnosis of papillary adenocarcinoma of the uterus had been made in another hospital. Roentgen therapy was given, but the dosage is not known. In September 1946, also in the other institution, a complete hysterectomy was performed. The pathologic diagnosis was "adenocarcinoma of the endometrium with metastases to the ovary." In March 1947 pelvic examination elsewhere raised suspicion of recurrence. At this time pelvic pain developed and gradually increased, requiring opiates for sedation. Vaginal bleeding developed three weeks before this admission, requiring one pad a day.

Blood in the stool had been noted in the past week, and there was rectal tenesmus. Recent anorexia had led to the loss of 7 pounds (3.2 Kg.) in weight. There had been one recent bout of nausea and vomiting. Pelvic examination revealed a rounded, hard mass of indefinite outline but seemingly about 15 cm. in diameter, occupying the site of the uterus. The mass seemed attached to the bladder and the rectal portion of the colon. Free bleeding followed pelvic examination. A biopsy specimen was taken from the vaginal vault and reported as showing adenocarcinoma.

A total pelvic exenteration was carried out on October 28. A long segment of sigmoid was necessarily removed. The ureters were implanted into the short remaining segment of colon and this was brought out tightly through the midline wound.

Convalescence was uneventful except for retraction of the colostomy below the skin level, despite which it continued adequate function. The patient was discharged on the eighteenth day after her operation.

Pathologic study revealed a rounded mass of recurrent adenocarcinoma 12 cm. in diameter, and histologic examination showed adenocarcinoma with invasion of the bladder and colon muscularis to, but not through the mucosae (Fig. 5).

On July 3, 1948, the patient was readmitted because of further retraction of the colostomy, cicatricial stenosis and a round mass about the colostomy in the abdominal wall, about 8 cm. in diameter, with several small purulent sinuses in it. The impression was recurrence of disease in the abdominal wall. The mass was widely excised; the colostomy was revised and again, under tension, brought through the abdominal wound. Histologic study revealed the mass to be entirely inflammatory, with no evidence of neoplastic cells.

After this, the course was entirely satisfactory. During the following years the patient has engaged in full domestic activity, doing all her work, such as the family washing, scrubbing floors, etc., and is generally as active as any vigorous 61-year-old woman. She cares for her husband, a "cardiac invalid." The colostomy stoma has again contracted to buttonhole size, but there is no inflammatory reaction in the abdominal wall, and the function is very satisfactory. Because of the cicatricial indentations on the abdominal wall and the patient's obesity, it is not possible for her to seal a bag onto the skin. She has devised a home-made bag which adequately fulfills her needs. Her scrupulous cleanliness is such that there are no odors about her person.

Five years after the operation her condition is excellent and there is no evidence of recurrent or metastatic disease (Fig. 6).

COMMENT

The feasibility of achieving four-year and five-year survivals after total and partial pelvic exenteration indicates that these pelvic exenterations are procedures no longer in the experimental stage but capable of affording long survival. The history of surgery has shown that progress in this type of work is necessarily slow and that much is learned as experience is accumulated. By the very nature of the conditions for which pelvic exenteration is indicated, the results in terms of "percentage of cures" will always be low, as most patients who present advanced pelvic cancer will die of cancer.

Aside from the prolonged survival, however, appreciable palliation is afforded to a large percentage of these patients. With increased experience, more will be learned about proper selection of patients and the risks inherent in the operation will be reduced. At any rate, pelvic exenteration is a procedure that appears capable of offering substantial benefits to patients whose preoperative condition was deemed hopeless, and these benefits include the possibility of five-year survival. Readjustment to the wet colostomy is not as difficult as it may appear to be. Actual experience has shown that these patients can be returned to a nearly normal existence as far as general activities are concerned, and of great importance is the return of their zest for living.

Personally, I am unable to subscribe to the point of view that "it is better to be dead than have to live on with such mutilations." I have had not a little experience with patients suffering from cancer. Very few, indeed, fail to want every chance for survival in reasonable comfort. Who is qualified to say whether another

is better dead than alive when he wants to live in reasonable comfort, no matter what the circumstances? As a matter of fact, so strong is the urge of life that in some patients who have been permitted to live have recovered their strength and have resumed their general physical activities; the desire for procreation has manifested itself to such an extent that they have spontaneously requested plastic procedures.

The obligation of the surgeon is to prolong life in comfort, and whenever possible he should seek to do this. The necessity for exenteration operations is evidence that we often fail to control certain pelvic cancers in the earlier stages. Certainly it is hoped that the necessity for such procedures may fade away completely in the future. But the patients with advanced and uncontrolled pelvic cancer cannot await some future discovery of biologic or chemotherapeutic cancer control. Theirs is an acute problem, which must be dealt with at the moment. It would appear that radical surgical intervention has something to offer some of these patients that may be more than just brief palliation.

SUMMARY

The author calls attention to the possible benefits of total pelvic exenteration for patients with advanced pelvic cancer, not only as a palliative measure but as a means of offering, in some cases, a survival period of five years or longer. In his experience, the wet colostomy is not so burdensome as is generally supposed, and the procedure is to be recommended when circumstances warrant it. Six illustrative cases are reported.

ZUSAMMENFASSUNG

Der Verfasser weist auf den moeglichen Nutzen der totalen Beckenausraeumung bei Kranken mit vorgeschrittenem Krebs des kleinen Beckens hin. Das Verfahren stellt nicht nur eine palliative Massnahme dar sondern bietet in manchen Faellen auch die Moeglichkeit einer Ueberlebensperiode von fuenf und mehr Jahren. Auf Grund eigener Erfahrung haelt der Verfasser die feuchte Kolostomie fuer nicht so beschwerlich; wie allgemein angenommen wird; er haelt das Verfahren fuer empfehlenswert, wo die Umstaende es gebieten. Sechs erlaeuternde Krankheitsgeschichten werden angefuehrt.

RÉSUMÉ

L'auteur attire l'attention sur les avantages de l'exentération pelvienne des patients présentant un cancer avancé du bassin, non seulement au point de vue palliatif mais aussi curatif. On rapporte jusqu'à 5 ans de survie. La colostomie "humide" n'est pas aussi onéreuse qu'on serait porté à le croire. Six case à l'appui.

RIASSUNTO

L'autore richiama l'attenzione sui possibili benefici della eviscerazione pelvica totale nei casi di cancro pelvico avanzato, non solo come misura palliativa, ma come metodo capace di offrire in qualche caso un periodo di sopravvivenza di 5 anni e più. Nella propria esperienzo la colostomia si è dimostrata meno insopportabile di quanto generalmente non si creda, e il metodo deve essere raccomandato quando le circostanza lo richiedano. Vengono presentati 6 casi dimostrativi.

RESUMEN

El autor llama la atención sobre los posibles beneficios de la exeresis pélvica total en pacientes con cáncer pélvico avanzado, no solamente como medida paliativa sino como medio, en algunos casos, de obtener un período de supervivencia de cinco o más años. Considera que la colostomía húmeda no es tan molesta como generalmente se supone, recomendado el procedimiento cuando la circumstancias lo indiquen. Se comunican seis casos ilustrativos.

SUMÁRIO

O autôr chama a atenção para os possiveis beneficios do esvasiamento pelvico nos doentes portadôres de carcinôma pelvico em estado adiantado, recomendando-o não somente como meio paliativo, mas tamben por oferecer em alguns casos um periodo de cinco e mais anos de sobrevida. Na sua experiencia, a colostomia não é tão incomoda como geralmente se pensa, e o seu processo é recomendado quando as circunstancias do caso lhe indicam. Seis observações ilustradas são apresentadas nêste trabalho.

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NINTH INTERNATIONAL CONGRESS, 1954

Under the Sponsorship of the Brazilian Government

Notice to All Members of the International College of Surgeons

The House of Delegates on May 9, 1952, in Madrid, Spain, decided that the City of Sao Paulo would be the meeting place of the next International Congress, approving the suggestion of His Excellency the Governor of the State, Prof. Dr. Lucas Nogueira Garcez. Brazilian members of the Board of Trustees were appointed to the Commission organizing the Congress, under the direction of Prof. Dr. Carlos Gama, Vice-President of the International Congress and Secretary General for South America.

The Ninth International Congress will be held from April 26 to May 2, 1954. The official topics are (1) experience with socialized medicine in different countries, (2) new uses of radiology with contrast media in the various surgical specialties, and (3) experience with antibiotics in all branches of surgery.

Since the Ninth International Congress will coincide with the Fourth Centennial of the City of Sao Paulo, it is hoped that the conference, in addition to being one of the most memorable ever held, will add much to the commemorative activities of Sao Paulo. In order that the Commission may obtain in advance a satisfactory idea of the number who will attend, to arrange the best possible accommodations for them and to insure that the program shall be absolutely functional, all who are interested are requested to write to the address below.

—Prof. Dr. Carlos Gama, Sao Paulo
Secretaria, Praca Ramos de Azevedo, 7.° Andar, Sala 710, Sao Paulo, Brazil.

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The Problem of Duodenal Ulcer

F. GREGORY CONNELL, M.D., F.A.C.S., F.I.C.S. (HON.)
OSHKOSH, WISCONSIN

STUDY of textbooks is, of course, fundamental; but a continual review of the current literature, with its constantly changing, often conflicting etiologic theories, therapeutic practices and evaluations of results, is a necessity that has been well emphasized by Walter F. Palmer's timely editorial[1] entitled "The Confusion in the Surgical Treatment of Duodenal Ulcer." This confusion is not limited to the surgeons or to surgical procedures.

As an example of the recent changes, Glenn,[2] in discussing a hesitancy to advise excision of a leiomyoma of the esophagus, refers to "the old days when the surgeon could not excise a good segment of the esophagus without great risk."

With this as a criterion, surgeons may "date" themselves.

The general practitioner and the specialist may, perhaps, smile superciliously at this criterion for putting the surgeon in his place, but if they are not familiar with so-called social medicine as well as physiotherapy and psychotherapy, with the new radioactive isotopes, atomic, ultrasonic, biophysical and physiochemical diagnostic and therapeutic procedures in diseases and degenerations, they too, should become concerned with their status as modern practitioners.

Diagnosis.—Among the many confusions, a fundamental question concerns the dissimilarities and the similarities of gastric and duodenal ulcer, which have been thought to be different diseases and thus given different names (Cruveilher's disease, gastric ulcer; Bycquoy's disease, duodenal ulcer).

Despite their occasional coincidence, the fact that gastric ulcers may be malignant or that they possess definite malignant potentialities necessitates separate classification in discussion, diagnosis, treatment and evaluation of results. This paper is concerned with duodenal ulcer.

A primary differentiation between organic and functional disease is sometimes difficult, because the two may be coincidental or sequential. Symptoms without discoverable cause, often called neurotic, may be due to dietary deficiencies, psychiatric maladjustments or other obscure causes.

It has been claimed that there is no such thing as functional disease. With the rapidly changing ideas concerning normal and abnormal physiologic function, the subject of semantics assumes increasing importance.

Because the stomach may act as a "sounding board" for many near and distant biliary, cardiac, vascular, renal, pulmonary, cerebrospinal or other diseases, these conditions may be confused with duodenal ulcer. The occurrence of typical symptoms with no ulcer present and of ulcer with no accompanying symptoms adds to the confusion.

It may be well to remember that the gastrointestinal tract is a unit: proximal lesions (e.g., peptic ulcer) or cholecystitis may present symptoms referable to the distal colon and called colitis, and on the other hand lesions of the rectosigmoid (diverticula or diverticulitis) may present symptoms referable to the proximal portion of the tract, such as pylorospasm.

Overclassification of gastrointestinal malfunctions into proximal, distal and middle leads frequently to confusion and error.

Roentgen data also may be variously interpreted. Chronic hypertrophic gastritis (Menetriere's syndrome), or prolapse of antral mucous membrane into the duodenum may cause confusion.

Read at the Seventeenth Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, September 1952.
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"Things are not always what they seem," and all duodenal deformities are not ulcer.

Etiologic Factors.—After the diagnosis (even on a "snap-shot hunch") and before rational treatment can be started, some concept as to the *cause* of the physiologic malfunction is necessary. Jones[3] has stated that the gastrointestinal tract presents more unsolved problems than does any other system of the body.

Etiologic theories conflict basically on the question whether the ulcer is a definite clinical entity or is to be classified as a local lesion of a general disease. The currently accepted cause of duodenal ulcer is actual or relative hyperchlorhydria, an imbalance between aggressive (hydrochloric acid-pepsin) and a protective (mucosal and circulatory factor. This seems to be substantiated by the stomal ulcer after gastroenterostomy for congenital pyloric obstruction, as well as by the development of peptic ulcer in alkaline areas adjacent to hydrochloric acid-secreting mucous membrane, e.g., the lower part of the esophagus, the antrum, the duodenum and the jejunum at the stoma and at certain Meckel's diverticulae.

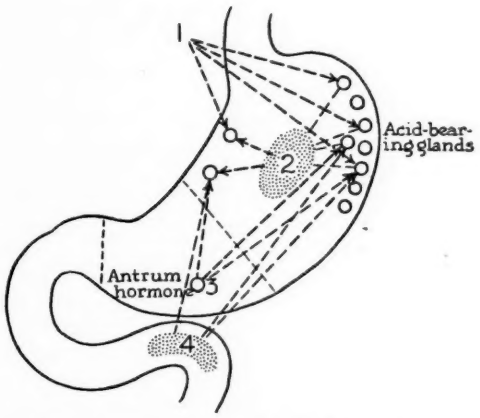
But the answer to one question may merely pose another problem: Why the hyperchlorhydria?

Its cause is probably not a single factor; it may differ in individual patients and under varying conditions.

Psychic or physical stress, anatomic or physiologic disturbances, somatic or sphanchnic or environmental factors may all have etiologic influence.

If vascular disturbances in various peripheral areas, e.g., coronary, pulmonary or cerebral, were bathed in digestive fluids as is the duodenum, ulcers similar to peptic ulcer might occur.

Perhaps, after one realizes that the gastrointestinal tract is a unit, and the body is an interrelated whole, and after one has learned more about the metabolism of sodium, potassium and other electrolytes, of capillary circulation, of vascular and of cellular permeability, of osmosis and of how nature produces *strong*



The usual conception of the mechanism of acid production in the stomach. *1*, afferent impulses, psychic and through taste and smell; *2*, contact of food in stomach; *3*, hormones produced in antrum; *4*, contact of food in jejunum (modified from Berg). *(From Surgery, Gynecology and Obstetrics, November 1929.)*

acids from weak alkalis, one may hope for the discovery of a definite cause and the consequent development of a cure.

Treatment.—Treatment is aimed at reducing hyperchlorhydria, which calls for a knowledge of the various stimuli to gastric secretion, outlined by Berg as follows:

1. Cerebral: neural, psychic, vagal.
2. Gastric: mechanical, chemical (food); hormonal, antral (gastrin).
3. Intestinal: Hormonal, duodenal, Brunner's gland (gastrin); hormonal, jejunal, histamine-like substance.

In view of the fact that the antral and the duodenal stimuli are similar in at least two respects, i.e., both are humoral and alkaline-secreting, it might be logical and make matters simpler if they were combined, called either humoral or alkaline, and regarded as starting at the antrum, instead of the duodenum.

Ivy[4] has expressed disapproval of such a change, saying, "It is true that they are both 'humoral' but I would not recommend this term for the reason given in (b).

"(b) The unique virtue of the system

cephalic, gastric and intestinal' is that it designates the phases always by the *site at which the stimulus is acting* (which is almost always known) and is noncommittal about the *mechanism of stimulation* (which even today is the subject of much controversy)."

The terms humoral and hormonal are not necessarily synonymous, but because of uncertainty they are, at present, generally used interchangeably; Ivy,[4] Sandweiss[5] and Jones[3] have all discussed this subject.

Gray and his associates[6] present additional cerebral or psychic stimuli transmitted by the blood stream (humoral or hormonal); in contrast, or ancillary, to the vagal or neural stimuli.

Treatment of duodenal ulcer has been a gradual development. At first it was nonoperative (medical, dietary and neutralizing); then surgical measures were taken, and gastroenterostomy and pyloroplastic procedures almost automatically followed the diagnosis of peptic ulcer.

Now, if the condition is uncomplicated, a return to nonoperative management is preferred; if complications are present, surgical treatment is thought to be indicated.

Nonoperative Treatment: Nonoperative treatment for uncomplicated ulcer is difficult, calling for cerebration by the physician and cooperation by the patient. It gives rise to confusion because of the many variations of the same old story of diet therapy, with frequent small feedings (which allow the digestive juices to act upon the gastric contents rather than on the gastric wall), with an ever-increasing array of newer alkalis, adsorbents (without acid "kickback"), demulcents, antihistamines, antilysozymes, enzymes, vitamins, minerals, hormones, endocrines, chalones, etc., etc.

Many antispasmodic drugs, such as atropine and its refinements Banthine, Bentyl, Prantal and others, employed to perform a so-called medical vagotomy, with the usual final addition of phenobarbitol, make the medical treatment similar to a "gunshot" prescription—a combination of many treatments for a single disease, in sharp contrast to the prevalent "broad spectrum therapy," i.e., a single treatment for many different infections.

All these measures reinforced by rest, physical and psychic, have been given an extensive clinical trial, but the results have not been entirely satisfactory.

An appreciation of the fact that not only does the patient have an ulcer but the ulcer has a patient (a human being, a personality) may improve results, which must await more definite knowledge of the etiologic factors involved.

Ivy[7] and Sandweiss[8] have isolated defensive "anti-ulcer" substances of Enterogastrone, Urogastrone, Anthol and Kutrol, which are on clinical trial.

The frequent spontaneous, unexplained, often seasonal, remissions that characterize the clinical course, perhaps after merely a change of environment, make evaluation of results extremely difficult—so much so that certain authorities arrive at the heterodox conclusion that no medical treatment is necessary.[9]

Surgical Treatment: Surgical treatment for duodenal ulcer is today thought to be indicated only for such complications as perforation, obstruction, intractability or hemorrhage. There is still plenty of confusion, however, with regard to the details.

For *perforation,* simple suture is the generally accepted treatment. Because of the frequent recurrences, however, subtotal resection has been carried out at the primary operation.

To add to the confusion, nonoperative treatment of perforated ulcer, under certain conditions, has been recommended but not accepted.[10]

Obstruction, if spasmodic or edematous, may be corrected by proper preoperative management; if due to scar tissue, by surgical intervention.

It has been claimed that the term "intractability" should be applied to the patient and not to the ulcer.

Acute massive hematemesis is, perhaps, the largest single factor in mortality, and

with improvement in preoperative and postoperative management, transfusions, antibiotics, fluid and electrolyte balance, etc., its treatment has become a most controversial subject.

The uncertainties of early prognosis, the possible spontaneous arrest of the hemorrhage, and the danger of not finding the source of bleeding all tend to defer operation. The present tendency seems to be toward earlier and more frequent operation, usually subtotal (distal) gastrectomy for patients over 50 years of age or after a second hemorrhage.

After surgical treatment has been selected, confusions continue and newer confusions arise. Surgical treatment has gradually developed *from* gastroenterostomies and pyloroplastic operations, *through* local resection, pylorectomy, and then, with removal of more and more of the acid-secreting proximal portion of the stomach, in a "shift to the left,"[11] *to* subtotal gastrectomy (distal). Vagotomy is on trial.

Surgical treatment should be based upon the fact, often overlooked, that the stomach is in reality a double organ, proximally acid-secreting and distally alkaline-secreting, and aims to reduce the hyperchlorhydria either *after* or *before* the acid is secreted.

After Secretion: Treatment after secretion is by gastroenterostomy or pyloroplastic operations for neutralization with regurgitated alkaline intestinal juices. At present, reports from various clinics both here and abroad indicate that gastroenterostomy has been practically abandoned except when organic obstruction is present and of course after distal resection for gastrointestinal continuity. At the Mayo Clinic[12] from 1931 to 1936, gastroenterostomy was performed in nearly 80 per cent of the operative cases. In 1950 partial gastrectomy was carried out in about 90 per cent. At the Lahey Clinic[13] in 1931, partial gastrectomy was performed in 22 per cent of cases and in 1950 in 91 per cent.

An editorial in *Gastroenterology,*[14] an article by Lewisohn[15] and other articles have emphasized the general dissatisfaction with gastroenterostomy for duodenal ulcer.

Conflicting opinions concern the removal of the ulcer. Its removal is unimportant if hyperchlorhydria is sufficiently reduced. According to Wangensteen,[16] "segmental resection confirms the thesis that excision of the ulcer is not necessary to cure the *ulcer diathesis,* as some surgeons continue to insist."

Cases of spontaneous remission and of successful nonoperative managements, as well as the many satisfactory results following operation in which the ulcer was nonresectable, seem to indicate that removal of the ulcer is not always necessary.

Before Secretion: Treatment before secretion may be undertaken by either indirect or direct measures.

Indirect minimization of hyperchlorhydria is done by interfering with either neural or humoral stimuli. The neural (vagal, psychic, cerebral) stimulation has been eliminated by complete vagotomy, a procedure that has passed through many vicissitudes in many articles since its enthusiastic recommendation by Dragstedt.[17] At first the approach was thoracic; now it is abdominal. At first it was performed alone; now it is combined with gastroenterostomy or pyloroplasty. In view of the fact that for many years gastroenterostomy was thought to be the "cure" of peptic ulcer, it seems illogical to give credit to vagotomy for symptomatic relief when gastroenterostomy is an added procedure. At first it was employed for all peptic ulcers; now usually for gastric ulcer, chiefly of the stomal variety.

Confusion is augmented, general acceptance is deferred and the therapeutic importance of vagotomy is diminished because of possible regeneration of the divided nerve, the presence of parasympathetic fibers in the sympathetic branch of the autonomic nervous system[18] and the compensatory action of similar gastric stimulants transmitted by humoral pathways instead of by the interrupted neural channels.

- Aim of Surgical Treatment Duodenal Ulcer: to reduce gastric acidity
  - After secretion of hydrochloric acid
    - Gastroenterostomy
    - Pyloroplasty, for neutralization
  - Before secretion of hydrochloric acid
    - Indirect (interference with stimuli to secretion)
      - Neural, vagotomy (Dragstedt)
      - Humoral, antrumectomy ("gastrin"; Edkins)
      - Hormonal, adrenal (Grey et al)
    - Direct (removal of proximal hydrochloric acid-secreting glands)
      - **With** alkaline-secreting antrum, i.e., distal gastrectomy
      - **Without** alkaline-secreting antrum, i.e., proximal gastrectomy
      - Complete fundusectomy

And now Gray and his co-workers[6] have presented evidence of yet another humoral stimulus, acting via the "hypothalmic-pituitary-adrenal cortex pathway."

A review of the voluminous literature[19] indicates that vagotomy is not generally accepted as a treatment for duodenal ulcer.

The vogue of vagotomy, i.e., interference with nervous stimuli *from* the hypothalmic center in the brain *to* the stomach, logically suggested a comparable study of the result in hydrochloric acid secretion after interference with psychic impulses *from* the cerebrum *to* the hypothalamic center, as in the prefrontal lobotomy of Freeman and Watts[20] and its modifications. Studies of gastric acidity in the "thalamic syndrome" might be worthwhile.

In the literature and in an unpublished postoperative study by Dr. John Mulvaney of 50 lobotomies at Winnebago State Hospital, the effect upon gastric acidity has been shown as equivocal.

Indirect humoral (or hormonal) interference is based chiefly upon removal of so-called gastrin (Edkins')[21] of the alkaline-secreting antrum.

Added confusion followed Kahlson's[22] report that a similar stimulus is secreted by Brünner's glands of the duodenum. A similar histamine-like substance may occur as a by-product of intestinal digestion and possibly in cellular metabolism. Code[23] stated, "Histamine is a normal constituent of the blood."

The extreme complexity of nature's various means of stimulating the important digestive function and the possibility of compensatory mechanism might explain the disappointing results observed after destruction of or interference with *but one* of the many stimuli.

Direct minimization of hydrochloric acid secretion seems to be most rational and is accomplished by actual removal of the hydrochloric-acid secreting apparatus. And it brings up the confusing question: What part shall be removed, and how much?

The answer is: the proximal part, because of the physiologic fact that the stomach is a double organ; the proximal

portion (fundus and body) secreting acid and the distal portion (antrum) secreting alkalines. As to the extent of resection, the coincidental improved results following more and more proximal resections, as seen in the so-called shift to the left,[11] has led to the currently accepted distal subtotal gastrectomy with removal of at least three-fourths of the stomach.

After extensive clinical trials, the remote results continue to justify the statement that there is no entirely satisfactory surgical treatment of the duodenal ulcer.

Various postgastrectomy syndromes, physiologic or anatomic, general or local, early or late, transitory or permanent, do occur in an unknown percentage of cases, e.g., from 96 per cent to 70 per cent satisfactory.

Walters and his co-workers[25] reported postoperative gastrointestinal ulceration in 122 cases; in 47 after gastroenterostomy and in 75 after resection.

The application of results of animal experiments to human beings may not always be justified, because of the dissimilarity in distribution of the gastric cells. Failure to distinguish gastric from duodenal ulcer in evaluating results also tends toward confusion.

In 1929[26] I advised preservation of the alkaline-secreting antrum, suggesting that its interposition between the acid-secreting proximal portion of the stomach and the vulnerable duodenum might be nature's protective measure, and recommended that the objective be accomplished by direct removal of the acid-secreting mechanism itself, i.e., by proximal gastrectomy (partial fundusectomy), which preserves normal physiologic gastrointestinal continuity. The immediate results were favorable, but within a few years the size, motor function and secretory function returned to normal and recurrences developed in 6 of 24 follow-ups.[27] This plainly showed that *not enough* stomach had been removed and suggested removal of more of the hydrochloric acid-secreting portion; that is, total or near total proximal gastrectomy. (This might be likened to the extension from local to partial, to the more satisfactory subtotal thyroidectomy employed in the surgical treatment of hyperthyrodism.)

Deloyers[28] is quoted as follows: "The most logical operation for peptic ulcer would be total fundusectomy with esophageal anastomosis. Such an operation would completely eliminate the acid-bearing area, but preserve the pyloric sphincter so that the dumping syndrome would be prevented."

Kittle and his associates[29] reported "Failure of Histamine-Beeswax Mixture to Produce Gastrointestinal Lesions in Dogs *After* Total Gastrectomy."

Total gastrectomy may not be necessary; retention of the alkaline antrum and the saving, for technical reasons, of a small border of cardia will cause sufficient postoperative reduction of hydrochloric acid secretion.

Wangensteen,[30] in his Alvarenza Lecture in 1950 and later, in 1952,[16] in an article entitled "Segmental Gastric Resection for Peptic Ulcer: Method Permitting Restoration of Anatomic continuity", reported the results in 60 patients operated on and in conclusion stated, "Whether segmental resection will come to supplant the conventional Billroth I and II operations when any one of the three procedures may be done, only time will tell.

"Segmental resection as described herein appears to thwart the ulcer diathesis in both dog and man. When accompanied by a sternotomy incision, it is easily performed. The early results of the operation appear to compare favorably with the results of the more conventional modes of gastric resection."

As the word "segmental" does not identify the area removed, it would seem advisable to substitute a more descriptive term, such as "total fundusectomy" or "proximal subtotal gastrectomy".

In view of the fact that surgical treatment of duodenal ulcer has been continually dynamic, and that this dynamism

will probably continue, a change from distal to proximal subtotal gastrectomy in treatment of complicated duodenal ulcer seems entitled to more extensive clinical trial.

SUMMARY

The constant changes in the gradual development of the treatment of duodenal ulcer (not including gastric ulcer) are mentioned, and conflicting opinions and practices are discussed.

Nonoperative treatment is indicated in uncomplicated and surgical intervention in complicated cases. The former is a difficult type of management, calling for cerebration by the physician and cooperation by the patient.

The development of surgical treatment is discussed, with the conclusion that the presently accepted subtotal (distal) gastrectomy is not entirely satisfactory, probably owing to insufficient removal of acid-secreting stomach and unnecessary removal of alkaline-secreting antrum, with the resulting abnormal gastrointestinal continuity.

A clinical trial of subtotal (proximal) gastrectomy, which obviates these objections, is recommended, in the hope that the results may be helpful in reducing some of the many confusions relative to the *unsolved* problem of duodenal ulcer.

RÉSUMÉ

L'auteur discute du traitement et des contradictions dans les opinions sur le traitement de l'ulcère peptique. Le traitement médical doit être recommandé pour les cas simples; tandis que la chirurgie s'impose dans les cas compliqués. L'auteur opine que la gastrectomie subtotale, souvent employée, n'est pas le traitement recommandable puisqu'il expose le patient à des récidives.

RESUMEN

Se mencionan los cambios constantes en el desarrollo gradual del tratamiento de la úlcera duodenal (exceptuando úlcera gástrica) y se discuten las opiniones y prácticas contradictorias.

Se indica tratamiento no operatorio para casos no complicados e intervención quirúrgica para los complicados, siendo el primero de tipo un tanto difícil, requiriendo el juicio del médico y la cooperación del paciente.

Se discute el desarrollo del tratamiento quirúrgico, concluyéndose que la gastrectomía subtotal (distal) aceptada ahora no es enteramente satisfactoria, debido probablemente a la extirpación insuficiente del antro secretor de ácido, con la resultante continuidad gastrointestinal anormal.

Se recomienda un ensayo clínico de gastrectomía subtotal (proximal) que no tiene estas objecciones, con la esperanza de que los resultados puedan ayudar a reducir algo de las muchas confusiones relativas al problema insoluto de la úlcera duodenal.

ZUSAMMENFASSUNG

Es werden die dauernden Schwankungen in der Entwicklung der Behandlung des Zwoelffingerdarmgeschwuers (unter Ausschluss des Magengeschwuers) besprochen und die widerspruchsvollen Ansichten und Verfahren eroertert.

Nichtoperative Behandlung ist in unkomplizierten, chirurgischer Eingriff in komplizierten Faellen angezeigt. Das konservative Verfahren ist eine schwierige Art der Behandlung, die vom Arzt viel Verstaendnis und vom Patienten Mitarbeit erfordert.

Es wird die Entwicklung der chirurgischen Behandlung eroertert, und die Schlussfolgerung gezogen, dass die zur Zeit anerkannte subtotale distale Magenresektion nicht voellig befriedigend ist. Der Grund dafuer liegt wahrscheinlich in einer unzureichenden Entfernung des saeureproduzierenden Antrums und in der daraus resultierenden Stoerung der harmonischen Magen-Darmeinheit.

Es wird empfohlen, die proximale subtotale Magenresektion, die diese Schwie-

rigkeiten umgeht, einer klinischen Pruefung zu unterziehen in der Hoffnung, dass die Ergebnisse zur Verminderung der zahlreichen verwirrenden Erfahrungen, die dem *ungeloesten* Problem des Zwoelffingerdarmgeschwuers eigen sind, beitragen moegen.

RIASSUNTO

Sono ricordate le tappe attraverso cui è passata la terapia dell'ulcera duodenale (gastrica esclusa) e i contrastanti metodi e opinioni.

Il metodo astensionista è indicato nei casi non complicati e l'intervento in quelli complicati. Il primo è più difficile e richiede attenzione da parte del chirurgo e collaborazione da parte del malato.

Viene discusso lo sviluppo dei metodi chirurgici, e si conclude che la resezione gastrica, attualmente in uso, non è del tutto soddisfacente, forse per la insufficiente asportazione dell'antro acido-secernente con conseguente anormale continuità gastro-intestinale.

Viene consigliato un metodo di resezione gastrica subtotale prossimale che potrebbe ovviare a questi inconvenienti, nella speranza che i risultati aiutino a risolvere la confusione relativa al problema, tuttora non risolto, dell'ulcera duodenale.

SUMÁRIO

As constantes modificações nas normas de tratamento da ulcera duodenal (não includindo a ulcera gastrica), são mencionadas nêstes trabalho, e relatadas tambem as divegências de opinião no particular.

Julga o autôr que o tratamento clínico deve sêr indicado nos casos simples, sendo a intervenção cirúrgica reservada aos casos complicados; para o primeiro caso, isto é, para o tratamento clínico, inumeras são as dificuldades existentes, por sêr um processo que exige muita argucia do médico e cooperação do doente. O tratamento cirurgico e apresentado, concluindo o autôr, não achar completamente satisfatória a gastrectomia sub-total (distal) presentemente aceita, em virtude da resseção insuficiente da região do antro de secreção acida, o que redunda numa continuidade intestinal anormal. Um ensaio de gastrectomia sub-total (proximal) que evitará essas objeções é recomendado pelo autôr, no desejo, salienta, de que resultados mais felizes possam sêr verificados, e bem assum para que sejam reduzidas algumas das múltiplas confusões ainda não esclarecidas suficientemente, no problema da ulcera duodenal.

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Malignant Disease of the Stomach: Modified Technic for Total Gastrectomy

CLAUDE J. HUNT, M.D., F.A.C.S., F.I.C.S.
KANSAS CITY, MISSOURI

GASTRIC ulcer and gastric carcinoma may be so closely related that an accurate diagnosis is difficult to make.

Gastric Ulcer.—The treatment of gastric ulcer is a controversial subject. Since there is no positive way to determine the true nature of a gastric ulcerative lesion, I am convinced that all of these ulcers should be considered malignant until proved otherwise.

The character of the lesion cannot be determined by medical measures alone, as many early malignant ulcerative lesions will respond for a time to medical management. This probably is related to the recession of the infection and the inflammatory reaction that is often associated with early ulcerative malignant disease.

This acute reaction may result from the corrosive action of the free acid that is so often present. Medical treatment neutralizes the acidity, and a brief response is the result.

Grimes and Bell[1] have reported that free gastric acid is associated with these ulcerative malignant lesions in about 75 per cent of cases and that, conversely, free acid may be absent in 20 to 25 per cent of the benign ulcerative lesions. Therefore, the absence or presence of free gastric acid is of little value in making a differential diagnosis.

The roentgen diagnosis may be unreliable as to the true nature of the lesion.

The diameter of the ulcer as obtained by roentgen studies offers no positive indication as to the nature of the lesion. Grimes and Bell[1] reported that 17 of 24 malignant ulcers, or 71 per cent, had a diameter of 3 cm. or less, while 74 of 99 benign ulcers, or 75 per cent, were 3 cm. or less in diameter.

In my own opinion all ulcerative lesions of the stomach are potentially "surgical" and, at most, only a very brief period of medical management should be tried.

If, then, there is a favorable response, frequent roentgen observation should be made to evaluate the result. The incidence of diagnostic error is fully 10 per cent, while the operative mortality rate is 1 per cent or less. Few complications and minimal morbidity follow the resection of a gastric ulcer; therefore, great responsibility rests upon the physician who elects medical rather than surgical management of the patient. Unfortunately, many may respond satisfactorily for a time, only to find in three to six months that the possibility of cure has passed. It cannot be overlooked that obliteration of an ulcer may be due to proliferation of malignant cells and not to fibrous tissue. Ulcers may heal with microscopic foci of malignant cells enclosed within. The roentgen ray does not differentiate between the types of healing that may occur.

Gastric Carcinoma.—The survival rate of gastric cancer after resection has improved little in recent years. The symptoms are vague; the patient presents himself late for diagnosis and the physician too often has a defeatist attitude toward operative intervention. A similar attitude is unusual with regard to other forms of disease, even though the prognosis is no more promising.

According to Pack and McNeer,[2] these malignant lesions are surgically removable in only about 35 or 40 per cent of cases, despite the fact that improved surgical technics permit removal of lesions that were formerly considered unresectable.

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Extension of the scope of surgical treatment often includes resecting segments of the colon and the mesocolon, as well as large portions of the pancreas. Until recently such procedures were considered impossible. It is gratifying to observe, in many instances, extension of life following these extensive procedures. On several occasions I have extended the resections to include one or more of these structures and the patients have survived five years or more in a few instances. Certainly this is a procedure of merit when its results are contrasted with the futile and frustrated results of palliative measures.

Total Gastrectomy. — Many surgical leaders[3] now advocate total gastrectory for all resectable malignant lesions of the stomach, regardless of their location. This radical procedure is directed at removing more gland-bearing tissue and is now being performed with a progressively reduced mortality rate. Mortality rates are determined largely by the technical skill and the surgical judgment of the surgeon.

The mortality rate of total gastrectomy naturally would be greatly reduced if the operation were performed for lesions in the distal part of the stomach. This may be the significant factor in the reported reduced mortality rate for total gastrectomy.

Many undesirable postoperative features are associated with total gastrectomy, such as malnutrition, inanition, secondary anemia and reflux esophagitis. These symptoms may be so pronounced as to be considered a serious objection to total gastrectomy.

It is yet to be proved that total gastrectomy will materially increase the five-year survival rate. When one considers the operative mortality and the postoperative morbidity, the routine procedure may be a high price to pay for the questionable extension of the patient's life.

For lesions low in the stomach without glandular extension along the gastrohepatic omentum a partial gastrectomy is probably the procedure of choice.

If there is involvement of the gastrohepatic omentum or the celiac glands, total gastrectomy will not result in cure but may afford relief for an indefinite time.

Total gastrectomy is indicated for the linitis plastica type of carcinoma and for lesions in the upper segment of the stomach.

Total gastrectomy is best reserved for those patients for whom total resection appears to be the only way in which all the visible disease can be removed.

Two factors are paramount to consider: the increased number of cured patients and a morbidity compatible with a comfortable life.

Surgical Procedures.—The standard type of esophagojejunostomy with enteroanastomosis does not afford a large capacity for food intake and does not entirely divert the duodenal contents through the stoma between the proximal and distal limbs of the jejunum. Reflux esophagitis frequently results, which causes discomfort and may promote stenosis of the esophagojejunal anastomosis.

Consequently several attempts have been made to overcome the undesirable features of total gastrectomy. Efforts have been directed at diverting the duodenal contents by a Rōux-en-Y procedure to prevent reflux esophagitis. Various segments of the intestinal tract have been transplanted to substitute for the removed stomach. The intent has been to maintain the normal flow of food content by way of the duodenum or to provide a pouch for greater food intake.

I have attempted to form a food pouch from a segment of the jejunum and have diverted the duodenal contents through a Roux-en-Y anastomosis of the divided segments of the jejunum. This will be described later.

A brief review of the development and periodic changes in the technic of total gastrectomy is in order here.

Connor[4] in 1884 probably performed the first total gastrectomy. Hoffman[5] in 1922, in an attempt to prevent some of the undesirable results of total gastrectomy, joined the two limbs of the jejunal loop to divert the duodenal contents and

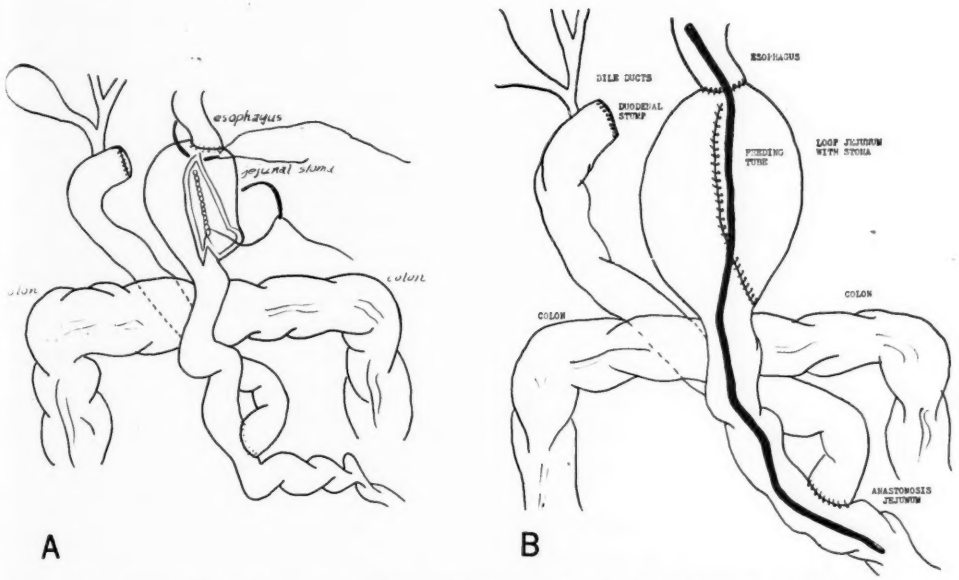

Fig. 1.—*A*, jejunal loop being converted into food pouch. Duodenal contents diverted by end-to-side anastomosis of jejunum. *B*, food pouch formed from jejunal loop with Rouxen Y anastomosis. Tube passed below well down jejunum for Murphy drip feedings.

prevent reflux esophagitis. This procedure was more extended in 1950 by Steinberg,[6] who described this wide anastomotic stoma between the proximal and the distal limb of the jejunum as a pantaloon anastomosis.

Orr[7] in 1947 utilized the Roux-en-Y principle to prevent reflux esophagitis, the distal limb of the Y being anastomosed to the esophagus in an end-to-side manner. This diverts the duodenal contents but does not provide any facility for increased food intake. Lee[8] in 1951 substituted the right colon and a small segment of the terminal ileum for the removed stomach, anastomosing the terminal portion of the ileum to the esophagus and the colon to the duodenum and restoring intestinal continuity by an ileotransverse colostomy. This affords an adequate food pouch, and the ileocecal valve prevents reflux of duodenal contents into the esophagus.

Lee operated on 16 dogs by this technic but obtained no prolonged survivals. The operation was successfully accomplished in 1 patient. Hunnicut,[9] at the Western Surgical Association in 1951, reported the successful use of this procedure in 3 patients.

State, Barclay and Kelly[10] in 1951 replaced the removed stomach with a segment of the transverse colon in 2 patients. This transplanted segment of transverse colon presents the problem of reverse peristalsis, which these authors consider an asset, as it prevents food from passing too rapidly into the duodenum.

Bell and Longmire[11] have replaced the stomach with a section of the jejunum brought up through the mesocolon and anastomosed to the esophagus and the duodenum. Jejunal continuity was restored by end-to-end anastomosis.

Cummins, Cope and I[12] have attempted to overcome the undesirable features of total gastrectomy by employing the Roux-en-Y procedure with the upper jejunum and at the same time constructing a food pouch out of the distal segment of the jejunum. Likewise, we have replaced the stomach by a jejunal pouch made by doubling back on itself an end of the

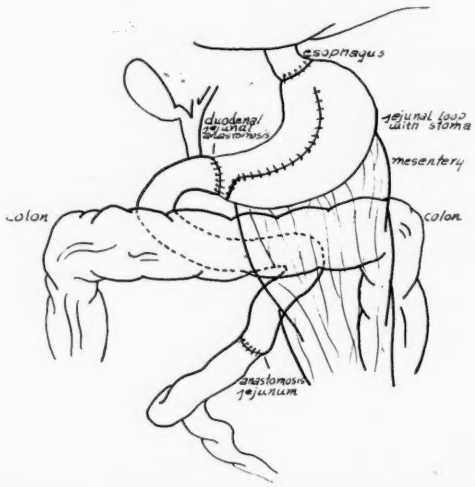

Fig. 2.—Proposed formation of food pouch from jejunum with anastomoses to esophagus and duodenum. Small bowel is united by end-to-end anastomosis.

jejunal segment and making a stoma between the two parallel bowel limbs.[12] This in turn is anastomosed to the esophagus and the duodenum. The proximal and distal portions of the jejunum after the segment is removed are united by end-to-end anastomosis. This makes a large food pouch and maintains the esophagoduodenal relation through the transplanted jejunal segment.

Operative Technics.—After the stomach, the great omentum and the spleen have been freed of attachments and the duodenal stump closed, the jejunum is divided between clamps about 12 to 14 inches (33 to 35.5 cm.) below the ligament of Treitz. The distal limb of the jejunum is brought up anterior to the colon, and the end is doubled back upon itself in a side-to-side manner for 6 or 7 inches (15.2 to 17.7 cm.). The sides of these loops are sutured together, and an anastomosis with a full-length stoma is made, the transected end of the jejunum being incorporated in the anastomosis (Figs. 1 and 2). This forms a large pouch, which is then anastomosed to the esophagus by interrupted silk sutures and continuous No. 00 chromic catgut. The placing of the posterior row of sutures is facilitated by traction on the attached stomach. After the posterior rows of sutures have been placed, the stomach is excised above the cardia and the anterior rows of sutures are placed.

To relieve tension, the anastomosed pouch is further supported by sutures to the diaphragm and the surrounding peritoneum.

The proximal jejunum is then anastomosed to the side of the distal portion of the jejunum, well below the pouch. Figure 2 shows the closed pouch anastomosed to the esophagus and the end-to-side anastomosis of jejunum to jejunum.

A Levine tube, which has been in the esophagus, is passed through the pouch well down into the jejunum below the Roux-en-Y anastomosis and is useful as a means of administering fluid and feedings by the Murphy drip in the postoperative period.

This procedure of using the distal segment of the jejunum for the food pouch diverts the duodenal contents to the jejunum below the pouch and prevents reflux esophagitis.

We have formed a food pouch to replace the stomach, similar to the one just described, by using an isolated loop of jejunum with its mesenteric atachment retained. The pouch is anastomosed to the esophagus and the end of the jejunum to the duodenum. The jejunum from which the isolated segment was removed is united by an end-to-end anastomosis (Fig. 3).

This appears to be a feasible way of substituting for the stomach a food pouch made from the jejunum that more closely approximates a normal anatomic relation, than is otherwise attainable.

REPORT OF CASES

CASE 1.—Mr. T. De L., aged 53, was admitted to the Research Hospital on February 18, 1950, complaining of epigastric distress and fullness on eating, difficulty in swallowing and a loss of 15 pounds (6.8 Kg.) in weight. Roentgen examination revealed a large filling defect involving the fundus and the entire lesser curvature.

The patient was prepared for gastric surgical intervention, and on February 22 a total gastrectomy was performed, with removal of the spleen and greater omentum and 3 cm. of esophagus was performed through a thoraco-abdominal approach. A food pouch was constructed from a loop of jejunum as aforedescribed. A Levine tube was passed into the jejunum beyond the pouch.

Tube feedings were started on the third day. On the tenth day the tube was removed and feedings were started by mouth. The patient had an easy postoperative course and was discharged from the hospital on March 13.

The pathologist reported a Grade III adenocarcinoma of the stomach, involving the lower portion of the esophagus and the upper half of the stomach, with metastases to all nodes. The patient gained 9 pounds (4.1 Kg.) after the operation, was holding his former job and was eating three normal meals daily. This condition of apparent good health continued, without distress or any evidence of esophagitis, until October 1951, when the gradual development of abdominal distention and progressive anuria was noted. He died on November 12 from uremia and colon obstruction due to peritoneal pelvic metastasis. Autopsy revealed a large uninvolved jejunal pouch, a patent esophageal stoma and abdominal pelvic metastasis. Figure 5 shows the capacity and size of the food pouch. Figures 6 and 7 show the operative specimen.

CASE 2.—Mr. W. R., aged 75, was sent to Research Hospital on Sept. 12, 1950, with a diagnosis of carcinoma of the stomach. Roentgen examination showed a large lesion involving the fundus and the lesser curvature, extending up to the cardia.

On September 16, after adequate preparation, a total gastrectomy was done through an upper left rectus approach, with removal of the spleen and the greater omentum. The glands around the celiac axis were removed, and a jejunal food pouch was constructed.

Tube feedings were started on the third day, and on the ninth day food was given by mouth. The patient had a satisfactory postoperative course and was discharged from the hospital on November 18, after a convalescent stay of three weeks. The pathologic diagnosis was Grade IV carcinoma involving the entire stomach and the adjacent glands. The patient died on Feb. 28, 1952, of intestinal hemorrhage. No autopsy was performed.

CASE 3.—Mrs. M. M., aged 57, was admitted to the Research Hospital on March 4, 1951, with a diagnosis of cancer of the stomach. She had had much gastric distress and had lost 25 pounds (11.3 Kg.) in weight. Roentgen examination revealed an extensive lesion of the pars media and the lesser curvature of the stomach.

At operation on March 7, an extensive carcinoma of the stomach, with involvement of the transverse colon, the mesentery and the colon by continuity, was observed. Total gastrectomy was performed, with removal of the spleen, the adjacent nodes and the segment of involved transverse colon and its mesentery. A jejunal food pouch as described was constructed, and an end-to-end anastomosis of the transverse colon was accomplished.

Tube feedings were continued until the ninth day. Because of an alarming distention of the cecum, a cecostomy was done on the third day. The patient had a very smooth postoperative course and was discharged on April 1.

The pathologist reported a Grade III adenocarcinoma of the stomach involving the proximal half, with a segment of colon involved by continuity.

Four months later, on August 4, the patient was readmitted for closure of the cecostomy. She was eating three meals a day, with midmorning and afternoon feedings, and had gained 4 pounds (1.8 Kg.). Her main complaint was that the cecostomy acted every time she ate. After closure of the cecostomy on August 8, this disquieting occurrence was eliminated. There had been no regurgitation or evidence of esophagitis. A report on Aug. 25, 1952 indicates a loss of weight and evidence of recurrence.

CASE 4.—Mrs. K., aged 74, entered the Research Hospital on June 3, 1951. Roentgen examination revealed a large polypoid lesion involving the greater and lesser curvature in the pars media of the stomach.

On June 11, through a transverse incision, a total gastrectomy was done, with removal of the greater omentum and the spleen, and a jejunal food pouch was constructed. Tube feedings were begun on the fourth day and oral feedings on the tenth day. The patient had an uneventful postoperative course and was discharged on July 1.

The pathologic diagnosis was reticulum-cell sarcoma involving most of the stomach

and invading the gastrocolic and gastrohepatic omenta.

The patient was examined roentgenographically on April 20, 1952, and was feeling well. She had gained 12 pounds (5.4 Kg.) in weight. The roentgen showed a large functioning food pouch. On Aug. 25, 1952, the patient's condition was satisfactory.

CASE 5.—Mr. A. R., aged 78, was admitted to the Research Hospital on June 13, 1951, because of three gastric hemorrhages in the past two months. The radiologist reported a large filling defect in the pars media of the stomach.

After several transfusions, operation was performed on June 21, at which time a total gastrectomy was done, with removal of the greater omentum and a portion of the transverse colon mesentery. A jejunal food pouch was constructed.

Tube feedings were started on the third day and oral feedings on the seventh day. The patient was discharged in good condition on July 5. The pathologist reported a large Grade III carcinoma of the pars media with ulceration and penetration of the anterior wall of the stomach. Now, fourteen months from the date of operation, the patient has mediastinal pain, probably indicating extension. Otherwise he looks well.

CASE 6.—Mr. S. T., a 65-year-old Negro, was admitted to the Wheatley Hospital on June 6, 1951, with a large carcinoma involving the upper half of the stomach. On July 13 a total gastrectomy, with construction of a jejunal food pouch, was done by Dr. W. W. Cummins of our group. A Levine tube was passed down into the jejunum, and tube feedings were given for six days, after which oral feedings were started. The convalescence and postoperative course were without incident, and the patient was discharged on the ninth postoperative day.

The pathologist reported an extensive Grade III carcinoma involving the fundus, the cardia and the lesser curvature of the stomach, with involvement of on adjacent lymph gland.

According to the latest report in March 1952, this patient is taking three fairly substantial meals a day, with additional nourishment in the midmorning and in the after-

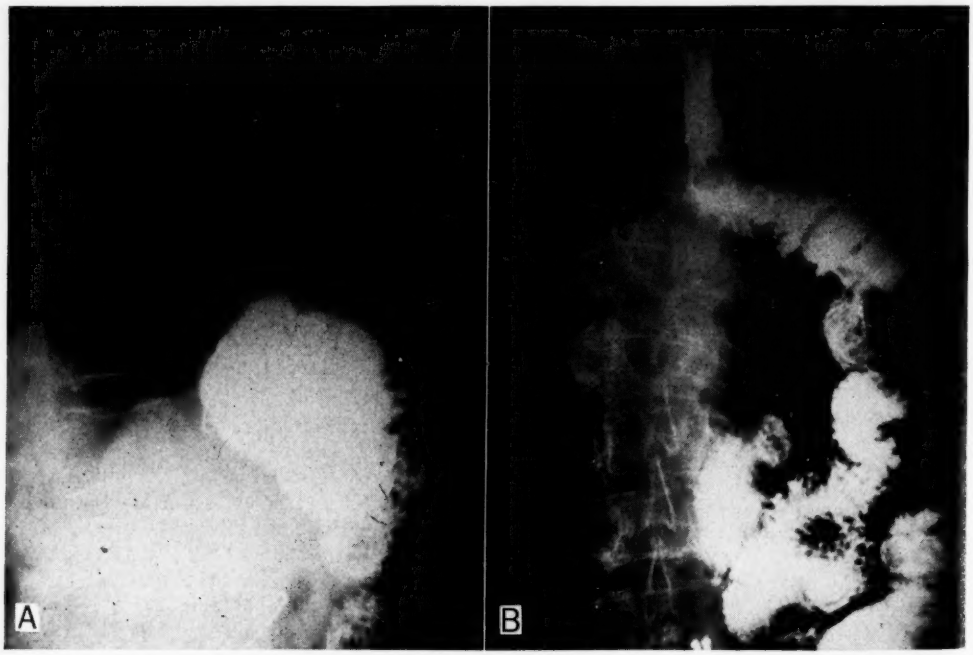

Fig. 3.—*A*, roentgen demonstration of size of food pouch in Case 1. *B*, emptying function of food pouch and apparent capacity (Case 3). This patient underwent simultaneous resection of the transverse colon.

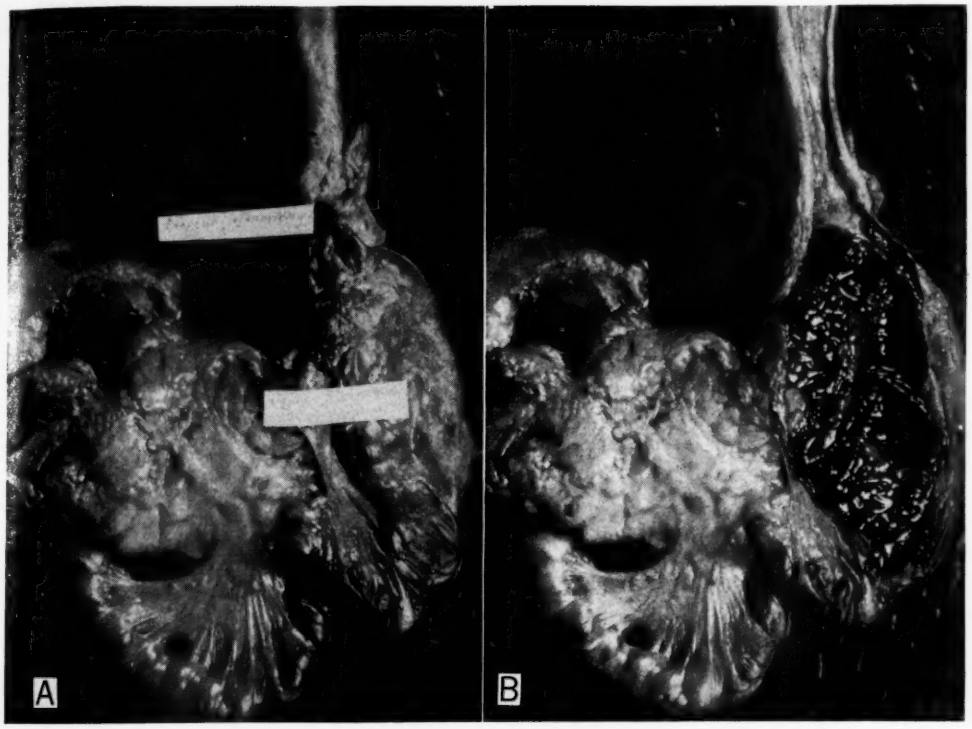

Fig. 4.—*A*, autopsy specimen of jejunal food pouch, showing esophagus pouch and jejunum below. The pancreas and duodenal closed stump are shown. *B*, open esophagus and jejunal food pouch of post-mortem specimen. Note size of food pouch and line of esophago-jejunostomy, which is not constricted or ulcerated. No esophagitis is present. The pancreas and duodenum are shown in the specimen.

noon. In August 1952 he could not be located.

CASE 7.—Miss E. G., a white teacher aged 65, was admitted to the Research Hospital on Oct. 17, 1951, with the chief complaints of epigastric pain, dyspepsia and loss of appetite of six months' duration. She had lost 18 pounds (8.2 Kg.) in the past six months. The value for hemoglobin was 67 per cent. Two 500 cc. transfusions were given. The radiologist reported a large ulcerated area on the lesser curvature of the stomach. On October 22 a total gastrectomy, with splenectomy and resection of all available glands around the celiac axis, was done. A food pouch of jejunum was constructed in the manner described, and the Levine tube was brought down the distal loop for purposes of feeding and fluid administration. At the time of operation no metastases were present in the liver. The pathologist reported a large carcinoma of the stomach, involving a small portion of the lower esophagus.

The postoperative course was uneventful until the sixth postoperative day, at which time the Levine tube slipped up and was removed. After this the patient began to regurgitate intestinal contents, and some thin barium was swallowed, which showed immediate passage through the food pouch. In the radiologist's opinion the obstruction was due to spasm or incomplete obstruction, and a waiting course was followed until November 5, at which time, since the patient continued to vomit on occasion, it was decided that a true obstruction of the small bowel existed.

The old incision was reopened, and an adhesive constricting band involving the lower part of the small bowel was found and released.

Case Record

Case	Patient	Age	Date of Operation	Pathologic Diagnosis	Complications	Operative Mortality	Duration of Life	Died
1	Mr. T. D.	53	2/22/50	Grade III adeno-carcinoma	None	0	20 months and 18 days	11/12/51
2	Mr. W. R.	75	9/16/50	Grade IV scirrhous carcinoma	None	0	17 months 12 days	2/28/52
3	Mrs. M. M.	57	3/ 7/51	Grade III adeno-carcinoma	Involvement of transverse colon necessitated resection and later cecostomy, cecostomy closed later		17 months alive with recurrence	
4	Mr. W. K.	74	6/11/51	Grade III adeno-carcinoma	None	0	12 months	
5	Mr. A. R.	78	6/21/51	Grade III adeno-carcinoma	None	0	12 months (alive; recurrence)	
6	Mr. S. T.	65	7/13/51	Grade III adeno-carcinoma	None	0	9 months (alive; now unaccounted for)	
7	Miss E. G.	65	10/22/51	Grade III adeno-carcinoma	Small bowel obstruction; operative release		1 month 22 days	12/14/51 Coronary thrombosis

Case 1.—The approach was through a thoraco-abdominal incision.

Case 3.—A segment of the transverse colon was resected along with the stomach. Continuity was reestablished by end-to-end anastomosis. Cecal distention developed. Cecostomy was done on the third postoperative day to prevent possible perforation of the suture line. Cecostomy subsequently was closed.

Case 8.—Postoperatively small bowel obstruction developed. This was released surgically. Both operations done by Dr. W. W. Cummins.

NOTE: All patients on unrestricted diet. Gain in weight after operation, (5 to 12 pounds Kg.).

The constricted area did not expand readily so an entero-entero-anastomosis was done. The patient reacted well; she was up and about and taking food on the second postoperative day. Except for slight drainage from the incision, she had an uneventful recovery and was discharged from the hospital on November 15. She died on December 14. Autopsy revealed coronary thrombosis.

COMMENT

The technic here described has been used by my associates and myself in 7 consecutive cases without mortality or undue morbidity. In each case a Levine tube was passed into the jejunum well below the Roux-en-Y anastomosis for feeding purposes and was left in place for an average period of nine days. In none of the cases was there evidence of a leak at the site of anastomosis.

None of the patients have complained of reflux esophagitis, and all have taken progressively more food with the passage of time, showing a corresponding slight gain in weight.

One patient had distention of the proximal portion of the colon after an associated transverse colon resection. Cecostomy was done and the stoma subsequently closed.

In 1 patient there developed an obstruction of the small bowel, which was surgically relieved.

It is not my opinion that any of these patients have been cured; the extent of the lesion in each case was too great. I present the technic in the belief that it provides an adequate pouch for food intake, lessens requirements for frequent feeding, provides facilities for balanced diet, diverts

duodenal contents and lessens the incidence of reflux esophagitis.

SUMMARY

The treatment of gastric ulcer and gastric carcinoma is discussed, with the author's description of his modified technic for total gastrectomy and the construction of a food pouch as a substitute for the stomach. It is his opinion that all ulcers of the stomach should be considered malignant until they have been proved benign. The gastrectomy technic presented has been employed in 7 consecutive cases without mortality or undue morbidity. Reports of the 7 cases are included.

ZUSAMMENFASSUNG

Der Verfasser eroertert die Behandlung des Magengeschwuers und beschreibt die von ihm angegebene Modifizierung der totalen Magenresektion. Er ist der Meinung, dass alle Magengeschwuere, solange nicht ihre Benignitaet bewiesen ist, als boesartig angesehen werden sollten. Die von ihm dargestellte Technik der Magenresektion ist in einer Reihe von sieben aufeinander folgenden Faellen ohne Todesfall oder ungewoehnliche Morbiditaet angewandt worden. Die Arbeit enthaelt die Krankheitsgeschichten dieser Faelle.

RÉSUMÉ

L'auteur discute du traitement de l'ulcére gastrique en rapport avec son procédé personnel de gastrectomie totale. D'après lui, tous les ulcères d'estomac sont malins, à moins de preuve du contraire. L'auteur rapporte 7 cas personnels opérés à sa façon, sans morbidité ni mortalité post-opératoire.

SUMÁRIO

Foi discutido nêste trabalho o tratamento da ulcera gastrica com a apresentação de uma técnica pessoal, proposta pelo autôr, a qual modifica a gastrectomia total. Acha êle que todas as ulceras do estomago devem sêr consideradas como cancerosas, até que se prove sêrem de natureza benigna. Aplicou êle a sua nova técnica para gastrectomia em sete casos consecutivos, sem registrar mortalidade. Inclue o autôr as suas observações no seu trabalho.

RESUMEN

Se discute el tratamiento de la úlcera gástrica, describiéndose la técnica modificada del autor para gastrectomía total. El autor opina que todas las úlceras gástricas deben considerarse malignas hasta probarse lo contrario. La técnica para gastrectomía que se presenta ha sido empleada en 7 casos consecutivos satisfactoriamente. Se incluyen comunicaciones sobre estos casos.

RIASSUNTO

Discussione sulla cura dell'ulcera gastrica e tecnica personale modificata di gastrectomia totale. Nel concetto dell'autore tutte le ulcere dello stomaco devono essere considerate maligne fino a prova contraria. La tecnica descritta è stata usata sette volte di seguito senza mortalità nè complicanze. Vengono riferti i casi.

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Shock

D. L. C. BINGHAM, M.B., CH.B., F.R.C.S. (CANADA), F.R.C.S. (EDIN), F.A.C.S.*
KINGSTON, ONTARIO, CANADA

URGED on by the spur of two world wars and by the ever-increasing toll of industrial and road accidents of this mechanical age, the medical profession has, in the last fifty years, increasingly examined the manifold problems of shock and its treatment. Yet, in spite of our unhappy familiarity with this condition, it is perhaps true to say that few of us have more than a mere acquaintance with its main features. Indeed, even a completely satisfying and all-embracing definition of "shock" still eludes us, and this, perhaps more than anything else, is responsible for our present confusion. But, although an all-inclusive definition of shock may not yet be possible, it should nevertheless be attempted at each stage in our investigations in order that discussion may be fruitful and research continue. The following considerations are suggested as a basis for argument.

Shock may be defined as that state which results from injury. Its features are variable and depend upon the type of injury sustained, the organs injured, the physical and mental state of the injured person prior to injury, and, perhaps more than anything else, upon the responses or reactions or compensations which the wounded person makes to overcome his injury. Or, to put it another way, shock is a departure from the normal due to injury.

The "normal" too is difficult to define. When one thinks and speaks of it, one means that average or normal state in which every cell and organ is able to carry out its appointed functions harmoniously, so that the whole thrives in a constantly changing external environment, maintaining the while a miraculously constant internal or cellular environment, the "milieu d'interieur" of Claude Bernard. In other words, the "normal" state of the whole is ultimately dependent upon the well-being of the cell, the elementary living, functioning unit, no matter how different its form or how curious its function, and each cell is, in the last analysis, dependent for health and survival upon its immediate environment, the extracellular fluid in which it lives and has its being.

Extracellular fluid is by no means a static, inert ooze. It is a complex mixture of organic and inorganic substances held in solution or suspended in a fluid water-like matrix. It is in unstable equilibrium with the plasma being formed from it, continually passing in and out of the blood stream, carrying nutritious substances, oxygen and salts to the cell, and the waste products of cellular metabolism to the plasma and so to the organs of excretion. Thus extracellular fluid is a dynamic, constantly circulating sea, filtered from the turbulent, hurrying arterial blood stream, and returned to it on the venous side of the circulation or by way of the lymphatics, by osmotic pressure differences. Upon its constancy of composition depends the very life of each cell and so the existence of the whole.

When one examines the agencies that control and maintain the constancy of the physical and chemical properties of extracellular fluid it is plain that, apart from certain chemical filters and factories such as the kidneys, liver and lungs, the most important agency is the circulating blood stream itself. If it fails all else fails. If it is reduced in pressure and rate of flow through the tissues, the rate of extracellular fluid formation and its rate of return to the circulation is likewise reduced, the metabolism of the cell suffers and a general depression in the state of "living" follows. This is fundamentally

*Professor of Surgery, Queen's University, Kingston.
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"shock", the departure from the normal. It is therefore clear that any injury or infection or toxemia that impairs the efficiency of the circulation also is a cause of shock. Thus sudden and rapid hemorrhage, pooling of large volumes of plasma, as after burns or chest injuries, wounds of the heart itself, or of the brain which regulates and controls the action of the heart and the tone of the blood vessels, all cause a decrease in circulatory efficiency, and shock inevitably follows to a degree approximately commensurate with the fall in circulatory efficiency.

This relation between depressed circulatory states and shock has long been recognized as one of the outstanding clinical features of the shock syndrome, and one aspect of circulatory inefficiency, reduced blood pressure, has for years been regarded as a valuable criterion of shock and index of its severity. But circulatory efficiency itself depends ultimately upon three factors:

1. A powerful pump—the heart.
2. An adequate blood volume.
3. Vascular channels in a state of tone.

When all these are normal the heart delivers at physiologic pressures a volume of blood sufficient for the nutrition of every cell in the body, and the total circulating blood volume fills completely all the pervious blood channels. This state of circulatory efficiency is maintained by reflex mechanisms within a wide range of tissue requirements. Thus, with the body at complete rest only a small volume of blood needs to be supplied, whereas in states of great physical activity many times this volume is required. At both extremes of physical activity the circulation fulfills the needs of the body as a whole and the "normal" state prevails.

How different, however, are circumstances when the circulation is impaired! The blood flow through the tissues is then reduced, normal interchanges between the blood and extracellular fluid are depressed, cellular metabolism consequently deteriorates, and "shock" develops.

Circulatory inefficiency may result from three main causes:

1. If the heart itself is injured or its own circulation is suddenly reduced, as in the presence of coronary thrombosis, it may be unable to supply, at physiologic pressures, a volume of blood adequate for the needs of the body. As a result, the blood flow through the tissues is reduced and pooling of blood takes place in tissue capillaries and in the larger veins. Widespread depression of cellular metabolism follows; in fact, a state of shock rapidly arises, which, if not quickly relieved by an improvement in the cardiac output, leads to death. Sudden widespread myocardial ischemia, and cardiac tamponade are classic examples.

2. Circulatory inefficiency also develops when the circulating blood volume is rapidly and substantially reduced by hemorrhage, loss of plasma or excessive loss of body secretions.

3. Circulatory inefficiency likewise arises when the volume of the pervious blood channels is rapidly increased without a comparable increase in circulating blood volume. This may take place with great suddenness from a widespread and rapid decrease in tone of small arteries, veins and capillaries, either reflexly from psychic or neurologic causes, from acute poisoning and toxemias, or from some other cause.

In each of the three main groups of causes of circulatory inefficiency, the all-important sequel is inadequate filling of the pervious vascular bed. As a result, the blood pressure within the vascular channels rapidly falls until a new and unstable equilibrium between blood volume, vascular bed volume, and, the now reduced blood pressure is established. Shortly, however, because of the imperative necessity of maintaining the rate of blood flow through vital organs, such as the brain, heart, liver and kidneys, the circulating blood volume is increased by the extraction of fluid from the extracellular fluid and cells; also the volume of the vascular bed is reduced by an increase

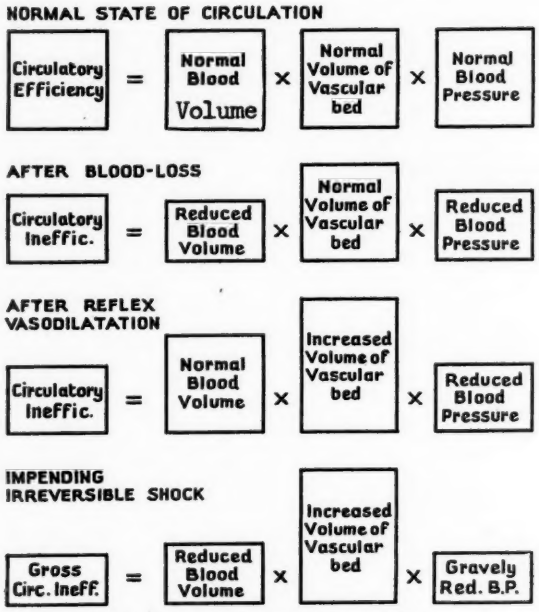

Fig. 1—Diagrammatic representation of shock.

in tone of small blood vessels throughout the body and widespread contraction of capillaries in the less vital organs, such as the skin. Equality or near equality may thus be reestablished between the circulating blood volume and the now contracted vascular bed volume, and, if the heart is normal, blood pressure will accordingly rise, perhaps to normal or even higher than normal levels, and shock may appear to have been overcome. This apparent recovery from shock is dangerously misleading and is often spoken of as the compensatory phase of shock, or "masked" shock, and a patient who is operated upon in this phase, without preliminary blood transfusion to restore his blood volume to its former level, is in great danger of overwhelming shock from the additional trauma of the operation.

Another and highly lethal set of circumstances may also arise in the case of the patient who has lost a substantial fraction of his blood volume but who has, for the time being, wholly or partly overcome the initial depression of blood pressure by compensatory mechanisms. Much of his apparent recovery is due to widespread constriction of small blood vessels in of relatively less important organs, such as the skin and subcutaneous tissues. This state of enhanced vascular tone cannot be sustained indefinitely, because tissues deprived of their normal blood supply are also deprived of their normal nutrition and the means of getting rid of the waste products of their metabolism. Injurious metabolites consequently accumulate in such relatively ischemic tissues until they reach a concentration at which they cause local vasodilatation and probably also a generalized decrease in vascular tone. As a result the vascular bed volume begins to enlarge and an increasing degree of disparity between it and the circulating blood volume arises, with a resulting drop in blood pressure and a decreased rate of blood flow through all the body tissues. A vicious circle then develops which leads rapidly on to irreversibility, a state in which peripheral vascular failure is so profound that pooling

of the remaining circulating blood in the relaxed vascular bed occurs, and blood transfused blood, even with apparently adequate amounts of blood, is unable to prevent the death of the patient.

From the foregoing discussion, which could be elaborated upon almost indefinitely, one all-important concept emerges —namely that, in order to sustain the integrity of the extracellular fluid and consequently the well-being and nutrition of the body as a whole, not only must the heart deliver at a normal pressure an adequate quantity of blood, but also (in order that a normal blood flow through all the tissues shall be maintained) the blood volume, the volume of the pervious vascular bed, and the blood pressure (peripheral resistance) must be normal. Thus, assuming that the heart is capable of working properly, circulatory efficiency depends upon the presence of a normal blood volume, a normal pervious vascular bed volume and normal tone or peripheral resistance in the vascular channels. Perhaps this concept can conveniently be expressed in the following equations:

1. Circulatory efficiency = normal blood volume × normal vascular bed volume × normal blood pressure
2. Circulatory inefficiency or shock = reduced blood volume × abnormal vascular bed volume × reduced blood pressure.

These equations are represented diagrammatically in Figure 1. The concepts will, in my opinion, be generally acceptable. They make it clear that, fundamentally, the treatment of shock should be the restoration of circulatory efficiency by: (1) restoring the blood volume to normal if it has been reduced; (2) restoring the volume of the pervious vascular bed to normal if it is increased, and (3) restoring the blood pressure to normal as rapidly as possible if it is reduced.

Until recently the treatment of shock has largely been confined to the restoration of blood volume to normal by intravenous blood transfusion. The method has justly been acclaimed as an immensely valuable means of overcoming shock, and it has saved countless lives. To be successful, however, it depends upon a substantial and increasing degree of tone in the smaller peripheral vascular channels, in order that blood added to the blood volume intravenously shall be returned to the heart and thus to the general circulation. If a reasonable degree of vascular tone is not present—e.g., in cases of late and severe shock—the blood given intravenously will largely accumulate in venous channels and capillaries and may indeed never pass through the heart and lungs to the arterial side of the circulation. Tissue hypoxia and cellular malnutrition thus persist, and the patient's condition becomes progressively more perilous.

Attempts to reduce the volume of the pervious vascular bed with vasopressor drugs have to date been disappointing and even deleterious in cases of severe shock. In the early stages of shock they merely attempt to reinforce the compensatory vasoconstrictor mechanisms already maximally at work. In the later stages of shock their vasoconstrictor effect is fleeting, the hypoxic, relaxed and malnourished capillaries and arterioles being incapable of sustained contraction even when adequate intravenous blood volume replacement has provided at least one of the primary requisites for recovery.

The third fundamental principle in the treatment of shock—raising the blood pressure to normal as rapidly as possible—is capable of fulfilment by intra-arterial transfusion at or above physiologic pressures.

Intra-arterial Blood Transfusion: It is curious that intra-arterial blood transfusion has not yet been more widely adopted for the prevention and treatment of severe shock. Indeed, it was not until 1939 that Birillo suggested the method and used it with success. Kohlstaedt and Page, at the suggestion of Colonel Sam. F. Seeley, M.C., U. S. Army, first used intra-arterial transfusion in the United States in 1943. Since then Glasser and Page (1946), Shaffer (1947), Kay and Hacker

(1947), Robertson and his co-workers (1948), Bingham (1952) and Haxton (1952) have reported on it. It was the report of Robertson and his associates that enlisted my own interest, and since 1949 my associates and I at Queen's University have investigated its possibilities both clinically and experimentally.

The experimental work was undertaken by my colleague, Dr. L. S. de S. Carey, and his associates, and was designed to compare the relative effectiveness of intra-arterial and intravenous transfusion in the treatment of severe shock brought about by massive hemorrhage. The experimental method used was as follows: To begin with, and to establish that the experimental method produced profound and fatal hemorrhage shock, 4 dogs were rapidly bled from the brachial artery until the blood pressure had fallen to a level between 60 to 70 millimeters of mercury. This level of moderate hypotension was maintained by additional bleeding for ninety minutes. Thereafter the blood pressure was reduced to 30 to 35 mm. and kept at this level of drastic hypotension for forty-five minutes. All 4 dogs died within an average of twenty minutes after the one hundred thirty-five-minute period of hypotension. The average amount of blood removed to maintain the hypotensive levels was 51.4 per cent of the total blood volume. It was thus clear that the dogs subjected to this procedure do not recover spontaneously.

Seventeen dogs were then subjected to the same shock-producing procedure, but were given intravenous transfusions at the end of the forty-five minute period of drastic hypotension. Only 4 recovered, a survival rate of 23.5 per cent. Shock was then similarly induced in 16 dogs, but this group was treated by intra-arterial instead of intravenous transfusion at the end of the period of drastic hypotension. Twelve recovered after intra-arterial transfusion, a survival rate of 75 per cent. Under the conditions of this experiment, therefore, the intra-arterial method of transfusion was at least three times as effective as was intravenous transfusion in the treatment of shock produced by massive hemorrhage.

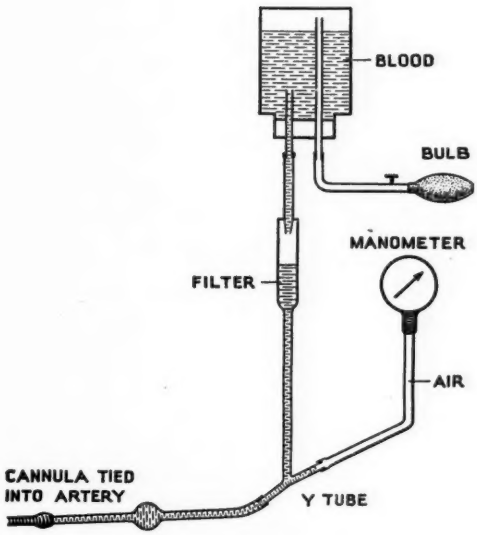

Fig. 2. — Apparatus for intra-arterial blood transfusions.

In addition, it was learned that a sustained rise in blood pressure to nearly normal levels was much more rapidly obtained by intra-arterial than by intravenous transfusion, and that the advantages of the former also included almost immediate restoration of the coronary, cerebral and renal circulation.

These experimental data, which are in general agreement with those of Kohlstaedt and Page, encouraged us to use intra-arterial transfusion clinically for patients in severe shock, and we have now done so on more than 120 occasions at the Kingston General Hospital. The cases included examples of exsanguinating operative and obstetric emergencies, gross traumatic shock in accident victims, severe burns, acute cardiac arrest, and operative shock, e.g., that associated with pneumonectomy. In addition, more recently, 2 patients with coronary thrombosis in severe hypotension and shock have been given intra-arterial transfusions. Our experience thus far has been entirely satisfac-

tory; indeed, I am prepared to state categorically that intra-arterial transfusion is far superior to intravenous transfusion, both in the treatment of established shock and as a preventive measure in operations in which serious and sudden shock may occur.

Practical Aspects of Intra-arterial Transfusion: The apparatus we use is the simplest we could devise, and is made from materials available in all hospitals (Fig. 2). An ordinary Baxter transfusion bottle containing 500 ml. of blood is used. Heparin (1,000 units) is added to the blood as an additional safeguard against clotting. To the longer glass tube, which reaches nearly to the bottom of the bottle, is attached a sphygmomanometer bulb by which controlled air pressure can be applied above the blood in the reservoir. To the shorter glass tube is attached the usual sterile rubber or latex tubing with a filter. Beyond the blood filter there is a sterile glass Y-tube, from one arm of which is led a sterile rubber tube containing air. This tube is connected to an ordinary aneroid gauge attached to a stand slightly above heart level. The final rubber tube for the administration of blood to the patient is then attached to a cannula or special needle inserted into a small peripheral artery, such as the radial or dorsalis pedis artery, or alternatively (as recently suggested by Haxton) to a special aortic puncture needle inserted into the aorta or other large artery.

Blood is caused to flow from the transfusion bottle by compression of the sphygmomanometer bulb, which raises the systolic pressure above the blood in the bottle, commonly to about 120 mm. of mercury. Pressure within the system is continually recorded by the aneroid manometer gauge, which depicts the pressure at which blood is being delivered into the arterial tree. It also is a valuable means of estimating intra-arterial pressure.

The rate at which blood is given can be accurately controlled. Initially, when the need for blood is desperately pressing, as much as 500 cc. can be given in as little as two or three minutes at a pressure of 120 mm. of mercury. Subsequently, when the blood pressure has risen to levels near the normal, the rate of transfusion can be reduced to a slow drip, and at this rate the transfusion can be continued for long periods. It is also important to record that large and rapid rates of transfusion may be more safely given intra-arterially than intravenously (Carey), and there need be no anxiety concerning this in clinical cases. Indeed, we have frequently given 1,000 cc. of blood intra-arterially in less than ten minutes.

The following difficulties are among the more important ones we have encountered: All connections between tubing and cannula, bottle, blood filter and aneroid manometer must be secure or leakage will occur. The cannula or special needle must be directed toward the heart, and it is desirable to support the arm with a crêpe bandage to prevent suffusion of the limb. In 2 cases ischemia of the radial half of the hand developed: in 1 of them this was rapidly overcome by the injection of 0.5 per cent procaine hydrochloride into the stellate ganglion. In the second case the terminal phalanx of the index finger was lost. Apart from these difficulties we have encountered no important complications. On the contrary, we have experienced nothing but satisfaction from intra-arterial transfusion. It has saved the lives of at least 6 patients and greatly facilitated and accelerated the recovery of many others.

One other possible and serious danger exists—air embolism. We have not encountered this complication, because all intra-arterial transfusions are continuously supervised. The incorporation of a check valve into the apparatus will, in our opinion, greatly reduce this danger.

SUMMARY AND CONCLUSIONS

It is suggested that the shock syndrome is fundamentally a state of widespread and profound derangement of cellular metabolism due to complex chemical and

physical disturbances in the body fluids.

The system that plays the largest part in maintaining normality in the environment of the cell is the cardiovascular system, and any derangement of it, whether of the heart itself, of the blood, or of the vascular channels, is a potent cause of shock.

Author's Note: It gives me great pleasure to record my gratitude to Dr. L. S. de S. Carey and his associates for their careful experimental and clinical work on this problem, and to Dr. James H. S. Mahood, my anesthetist, for his unfailing interest in the care of my patient and his constant supervision of intra-arterial transfusion during and after operation.

RESUMEN

Se sugiere que el choque constituye fundamentalmente un estado de amplico y profundo trastorno del metabolismo celular, debido a complejos trastornos físicos y químicos en los líquidos orgánicos.

El sistema que toma la mayor parte en el mantenimiento de la normalidad en el ambiente celular es el cardiovascular, siendo una poderosa causa de choque cualquier trastorno del mismo, ya sea cardíaco, hemático o vascular.

ZUSAMMENFASSUNG UND SCHLUSSFOLGERUNGEN

Es wird die Ansicht vertreten, dass das Schocksyndrom im Grunde genommen einen Zustand umfangreicher und tiefliegender Stoerungen des Zellstoffwechsels darstellt, bedingt durch komplexe chemische und physikalische Veraenderungen der Koerperfluessigkeiten.

Der Apparat, der den groessten Anteil an der Erhaltung normaler Verhaeltnisse im Zellmilieu hat, ist das Herz-Gefaesssystem. Jede Stoerung dieses Systems, ob sie das Herz selbst, das Blut oder die Gefaesse betrifft, kann eine wirksame Ursache des Schocks bilden.

SUMÁRIO E CONCLUSÒES

Pensa o autôr que a sindrôme do "choque" seja, fundamentalmente, um estado grave e profundo de perturbações do metabolismo devidas a reações fisicas e quimicas muito complexas nos liquidos orgânicos. O sistêma cardio-vascular e aquêle que tem papel mais saliente na manutenção da normalidade celular, todavia, nenhuma perturbação do mesmo, ou particularmente do proprio miocardio, do sangue os dos vasos é causa potencial do choque.

RIASSUNTO E CONCLUSIONI

Viene avanzata l'ipotesi che lo shock sia fondamentalmente uno stato di diffusa e profonda alterazione del metabolismo cellulare dovuto a complessi disturbi chimici e fisici dei liquidi corporei.

Il sistema cardio-vascolare è quello che sostiene il ruolo principale nel mantenere alla norma l'ambiente intracellulare, e ogni alterazione di tale sistema, o del cuore stesso, o del sangue, o della rete vascolare, è causa di shock.

RÉSUMÉ

Le syndrome de Shock est la conséquence d'un dérangement grave du métabolisme cellulaire consécutif à des perturbations physiques et chimiques des électrolites corporels. C'est le système cardiovasculaire qui joue le rôle important dans cet équilibre du métabolisme; conséquemment, un dérangement du coeur, du sang, des vaisseaux sont autant de causes du shock.

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Results of Sympathectomy for Peripheral Vascular Disease, With a Fifteen-Year Evaluation of Cases

JAMES W. HENDRICK, M.D., F.R.C.S., F.I.C.S., AND ERNEST G. GUY, M.D.
SAN ANTONIO, TEXAS

THE modern concept of the treatment of peripheral vascular diseases began in 1924 when Royle[1] demonstrated that coldness and sweating of the skin of the extremities disappeared after regional sympathectomy. Adson and Brown in 1925,[2] by means of calorimetry, demonstrated by skin temperature studies that vasospasm of the lower extremities was relieved in most instances by lumbar ganglionectomy and periarterial sympathectomy. The utilization of these earlier observations has contributed much to the treatment of a group of peripheral vascular diseases and permitted the patient to reoccupy his place in industry and society.

Since the peripheral circulatory system includes arteries, arterioles, veins and capillaries, any obstruction of these vessels is most significant. Such obstruction to the peripheral vascular tree may be acute or chronic, functional or organic, or a combination of these. The various diseases caused by the obstruction are frequently not well defined and often seem to merge with one another, but in general, each produces its own symptom complex. A better comprehension of the pathologic physiology of peripheral circulation, the exchange of tissue fluids, and the effect of vasospasm on peripheral circulation permits a large group of patients who formerly had gangrene or other debilitating forms of peripheral vascular disease to be restored to normalcy. It has only been in the last quarter century that release of the arterial tree from the sympathetic nervous system has become a proper form of treatment in various vasospastic conditions.[2]

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A complete history and physical examination of the patient is essential in the diagnosis of peripheral vascular diseases. Several laboratory methods have been developed which permit an objective evaluation of the peripheral circulation. These are not utilized to establish a diagnosis but to determine impairment of the circulatory physiology of the limbs with arterial insufficiency and aid the surgeon in selecting patients for operation whose peripheral circulation will be improved by sympathectomy.[3]

Diagnosis.—Factors to be considered in the diagnosis of peripheral vascular disease are: the presence or absence of pulse in the extremities; color changes when the limb is elevated or in the dependent position; trophic changes in the nails and skin of the digits, and the temperature of the skin of the tips of the digits. The history should determine whether pain is present in the extremity and whether it is associated with exercise or rest. Pain is the most common symptom when vasospasm is present. It is important to determine whether the pain is persistent, whether it follows exercise of whether it develops after the extremity is at rest. Persistent pain is most frequently associated with neurovascular[10] changes, ischemic neuritis, chronic thrombophlebitis, acute arterial occlusion, or arteriosclerosis obliterans with or without diabetic ulceration or gangrene. Intermittent claudication results from ischemia produced by insufficient blood supply to contracting muscles and is present in occlusive arterial diseases of the extremities. Intermittent pain is also associated with venous insufficiency, lymphedema, lipedema,[4] severe anemia, and marked hypothyroidism. In these cases it is relieved by rest.

When feasible for careful laboratory evaluation of the circulation of the extremities, the patient should be placed in a room at constant temperature, in which some of the various tests may be more scientifically executed. The tests that are practical and utilized are blocks of the posterior tibial nerve, the lumbar sympathetic chain or the appropriate sympathetic ganglion if the upper extremity is involved; skin resistance test, walking test, ergometric test and digital plethysmography.

Since intermittent claudication is the most common symptom complex associated with occlusive arterial disease, it is essential that the patient's ability to walk and the distance and the rapidity of the gait be determined. The patient is required to walk over a measured distance and is encouraged to walk as fast as possible. Most patients who are able to walk a full mile are considered to have normal arterial flow of blood in their extremities.

A thermocouple is used to measure skin temperatures.[5] An inexpensive thermocouple has been widely used and is sensitive enough for clinical use; a more elaborate thermocouple has been developed for research.

Recently a very practical usable plethysmograph (the Grass electroencephalograph) has been developed and is utilized by Linton and his associates.[3a] This instrument records quantitative measurements of the increase in size of the digit produced by momentary excess of inflowing over outflowing blood and affords a convenient method for measuring the pulsatile blood flow to a digit. It is also a practical method of determining the variations in pulse amplitude between normal digits and those with arterial insufficiency and between the same digit in the state of vasoconstriction and that of vasodilatation.

Classification.—The following classification of peripheral vascular disease has been utilized by us for a period of several years. Although it is not all-inclusive, it forms a practical working classification[6]: (1) vasospastic functional disease; (2) vasospastic organic disease; (3) organic degenerative disease with or without vasospasm, and (4) hyperactivity of the vasomotor system.

Factors to be considered in the management of patients with peripheral vascular diseases are: age, occupation, and emotional status of the patient; duration of the disease and whether or not it is vasospastic; and the use of tobacco, which is the most important of these factors. It should be emphasized to patients with peripheral occlusive arterial disease that, if they expect to keep their extremities,[6a] they must abstain from the use of tobacco.

The following peripheral vascular diseases are amenable to surgical treatment of the sympathetic nervous system if diagnosed before permanent changes and irreparable damage to arteries and tissues have occurred[7]:

1. Raynaud's disease.
2. Thromboangiitis obliterans (Buerger's disease).
3. Peripheral vascular sclerosis (with or without associated diabetes mellitus).
4. Causalgic states.
5. Acute arterial embolism.
6. Hyperhidrosis of nervous origin.
7. Frostbite.
8. Poliomyelitis with vasospasm in young persons.
9. Acute injuries to regions of major blood vessels.

Treatment.—Before therapy is administered to a patient with a peripheral vascular obliterative disease, it is essential to have an evaluation of the patient's general vascular status to determine whether the peripheral disease is a part of a generalized obliterative vascular disease. In addition to thorough physical examination, a careful history should be taken to determine whether there has been a cerebral, cardiac, or visceral vascular accident. A two-meter chest film, chemical studies of the blood for nonprotein nitrogen, blood sugar and blood cholesterol, and an electrocardiogram should be made.

The function of therapy for peripheral

vascular diseases is to increase the blood supply to the affected extremity. In the past few years several new drugs, among which are Tetra-ethyl ammonium and Priscoline,[8] have been used in the diagnosis and treatment of peripheral vascular disease. These drugs, in our experience, give limited relief to vasospasm and are unsatisfactory for treatment of chronic peripheral vascular disease, since the entire sympathetic nervous system is affected by the drug and action is not limited to the extremity requiring the vasodilatation. The efficiency of operations on the sympathetic nerve in correcting ischemia of the muscles and tissues depends on improvement of collateral circulation and permanent vasodilatation of the diseased vessels. The pathologic picture of decreased circulation is produced by a decrease in the intraluminal volume of the peripheral vessels due either to abnormal spasticity or to obliterative structural changes in the vessels. The latter may be an unalterable pathologic process; the former, however, is functional and amenable to appropriate therapy. The function of sympathectomy in the treatment of peripheral vascular disease is directed toward[8a] (1) improving the circulation by eliminating reflex vasospasm originating in diseased or thrombotic segments of the arteries or veins; (2) eliminating postural or reflex thermal vasoconstriction; or (3) eliminating vasoconstriction associated with mental anguish, such as worry, anger, or the performance of a difficult task.

A study of 198 patients treated for peripheral vascular diseases by sympathectomy during a fifteen-year period has been made, with a follow-up in at least 85 per cent of the cases (Fig. 1). Either one extremity, two extremities or, in a few instances, all four of the extremities were sympathectomized. In cases in which obliteration of the arteries was encountered, careful attention was directed to determine (1) whether the sympathectomy restored the patient to his former activity before development of the disease: (2) in the more severe cases, whether a limited amputation was necessary at the time of sympathectomy; or (3) whether latter amputation was necessary because of further progress of the disease.

Thromboangiitis Obliterans, or Buerger's Disease.—This is a chronic disease more frequently encountered in men than women. The average age of onset of the disease in this group was 34 years (Fig. 2); the youngest patient was 18 years of age. Thromboangiitis obliterans, or Buerger's disease,[9] is primarily a disease of the vessels of the extremities; however, the vessels of the brain and viscera may be affected. The lower extremities are more frequently involved than the upper in a ratio of about 10 to 1. Two patients in this group were relieved by sympathectomy of all four of their extremities but died four and six years later, respectively, from Buerger's disease involving the viscera. This disease is a form of recurrent arteritis and phlebitis, with many manifestations of a chronic inflammatory process.[10] The first symptom of the disease in the acute or subacute phase is segmental involvement of the small arteries and veins of the extremities, with painful nodules occurring along the vessels, and has been termed phlebitis migrans by some. The lesions begin most frequently in segmental areas of the vessels, with normal areas between the diseased segments, but in time all coats of the vessels become involved. The smaller vessels, such as the digital, radial, ulnar, anterior and posterior tibials, are affected first; later the larger arteries become involved.

The cause of Buerger's disease is unknown. From studies of large groups of cases, it is notable that practically all patients are constant smokers.[11] The primary pathologic feature seems to be an abnormal reaction of the vessel wall to some stimulus causing formation of segmental thrombi. These thrombi, with the accompanying perivascular reaction, produces a reflex spasm of the vessel which aggravates the disease and limits circulation of the extremity. It has been shown

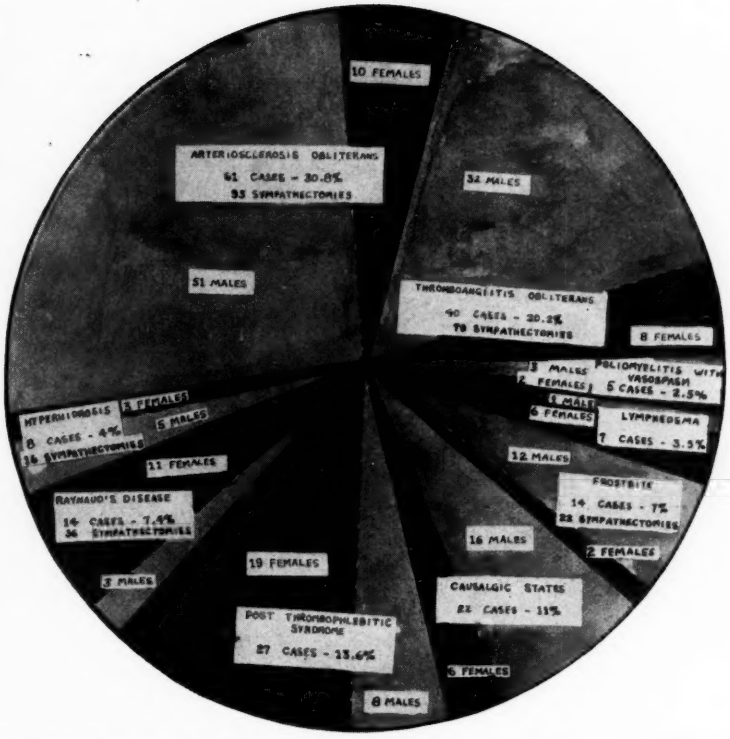

Fig. 1.—Diagram showing types of peripheral vascular disease in 198 patients who had sympathectomized patients, with incidence of each in the males and in the female.

by de Takats[12] that oxygen saturation of the arterial blood is low in the involved extremity and clotting factors are increased.

It has been shown in previous communications[13] that Buerger's disease may be classified into four types. The first type shows mild fatigability of muscles of the extremities, mild color changes, and coldness; the fourth type progresses so rapidly that massive gangrene develops with a few weeks or months in spite of any treatment that may be instituted.

Early symptoms of Buerger's disease in the acute stage are patchy areas of arteritis and phlebitis, with pain in the involved extremity. Red streaks are encountered on the skin along the course of the small arteries and veins, with induration around the vessels produced by accompanying lymphangitis. A symptom of the chronic state is pain of the intermittent claudication type, which becomes more severe during cold weather. The involved extremity is cold most of the time; the patient usually wears additional clothing on that area even in warm weather. Most frequently the pain occurs in the calf muscles and the arches of the foot. It is not unusual for these patients to be treated for arthritis or arch trouble for long periods. Color changes occur during the change of posture of the involved extremity. The foot assumes a pallor (Fig. 3) when it is elevated for several seconds and cyanosis with rubor when dependent. As the disease progresses, the extremity becomes

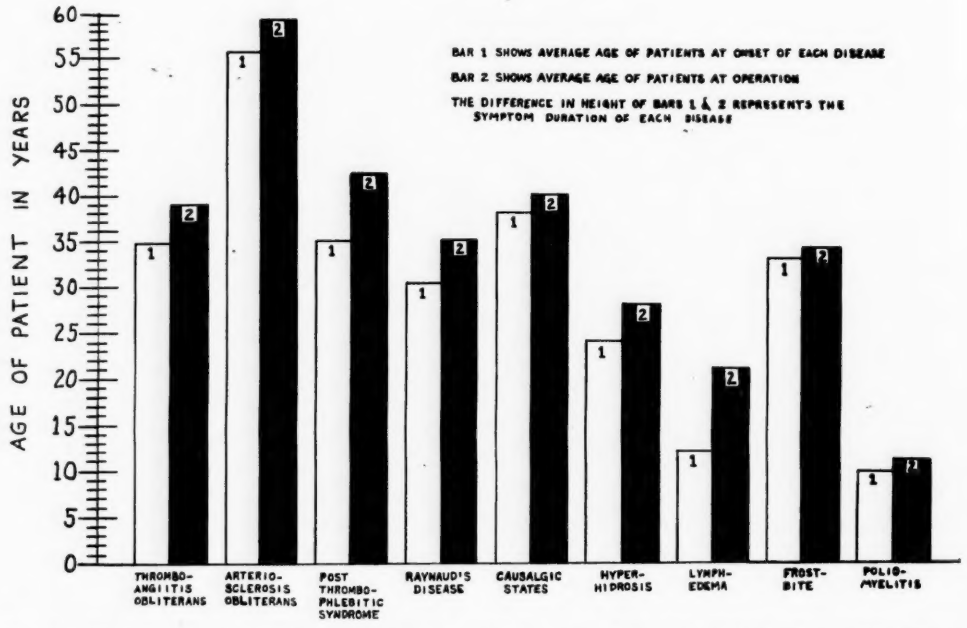

Fig. 2.—Diagram showing *(1)* average age of patients at onset of each peripheral vascular disease in a series of 198 cases and *(2)* average age of patients at time sympathectomies were performed. The difference in the heights of Bars 1 and 2 shows the duration of each disease.

cold and moist, with patchy ulceration and gangrene of the digits. Three patients of this group of 40 who were treated by sympathectomy had sufficient involvement of the arterial system to require minor amputations at the time of sympathectomy, consisting of removal of part or all of a digit or several digits of the extremity.

Buerger's disease in acute and subacute phases is treated medically. Absolute rest in bed is essential to prevent progress of the disease. De Takats[88] has found sodium thiosulfate, 1 Gm. given intravenously every second day for two to four weeks, to be of value. Periphlebitis, periarteritis and accompanying lymphangitis are treated with superficial roentgen therapy given three times a week for three to six weeks. Sympathectomy should absolutely not be utilized in the acute or subacute stage. In 1 case in this series sympathectomy was done in the acute phase of the disease; it seemed to hasten gangrene of the involved extremity and resulted in amputation. Sympathectomy has been of distinct value in the management of the chronic form of this disease if utilized before too extensive involvement of the vessels has taken place and when there is good response to clinical and laboratory examinations. When ulceration and gangrene are present and there is limited rise in skin temperature after posterior tibial nerve block or lumbar sympathetic nerve block, sympathectomy will offer little to alter the course of the disease. Its only value in the more severe forms is that only a midtarsal amputation may be necessary after sympathectomy, instead of a supracondylar amputation. Of the 40 patients in this series who were treated by either unilateral or bilateral sympathectomy for Buerger's disease, the

results were classified as excellent in 28 cases, improved in 8 cases and without results in 4, in which later amputation was required (Fig. 4). As has been mentioned, previously, 2 patients died later from visceral involvement in the disease. The best results in Buerger's disease may be obtained by early diagnosis and proper evaluation of the patient's condition, adequate sympathectomy for the involved extremity, and absolute discontinuance of the use of tobacco.

Raynaud's Disease.—Raynaud's disease in its earlier stages is a functional vasospastic condition.[14] This syndrome occurs in a younger group of patients than does Buerger's disease. The upper extremities are more frequently involved than the lower in a ratio of approximately 4 to 1. The symptoms begin with intermittent color changes in the terminal portions of the digits, involving both extremities, not necessarily to the same degree, and all four extremities may be involved. These color changes may vary from blanching to redness and cyanosis. Later the digits become moist, numb and cold, with permanent damage in the terminal area due to hypertrophy of the muscle walls of the vessels and thrombosis. When the disease becomes advanced, the skin becomes thin; the fat pads of the digits disappear, and there is sclerosis of the connective tissue resulting in a state of sclerodactylia. In this stage the disease is no longer vasospastic but organic with some vasospastic elements. In the terminal stage of Raynaud's disease patches of ulceration and gangrene develop in the digits, with infection, thrombosis of the small vessels, and constant excruciating pain. In this stage vasospasm is a negligible element.

Sympathectomy is useful in the treatment of the disease only when vasospasm is still an element and before there is arteriolar and venular destruction.[15] If the finger tips do not warm up immediately after nerve block or sympathetic nerve block, sympathectomy is contraindicated, for the result of the operation will be nil. Sympathectomy has not been so satisfactory in the treatment of Raynaud's disease as in that of other forms of peripheral vascular disease, especially of the upper extremities. This is evidenced by recurrence of symptoms after three or four years, probably attributable to regeneration of the nerve. This has necessitated a more extensive sympathectomy according to the technic developed by Smithwick,[16] which has proved advantageous in our hands. However, in some more advanced cases, when the operative technic is properly utilized, even though there may be some evidence of recurrence and color changes may be present, sweating is seldom observed and the severe burning and coldness in the digits disappear.

In this group of 198 cases of peripheral vascular disease, there were 14 cases of Raynaud's disease. Eleven of the patients were women and 3 were men. Sympathectomy was utilized for all 14 in both upper or both lower extremities and in 1 case in all four of the extremities. Ten patients showed excellent results; the condition of 3 was improved, and 1, with advanced disease of the upper extremities, obtained no improvement and later committed suicide.

Arteriosclerosis Obliterans.—More patients are affected with arteriosclerosis obliterans than with any other peripheral vascular disease. This disease is most frequently encountered in patients over 50 years of age, and men are more often affected than women in a ratio of approximately 5 to 1. In this group of 198 cases of peripheral vascular disease, 61, or 30.8 per cent, had arteriosclerosis obliterans. Of these 61 patients, 16 had diabetes mellitus. The average age of onset of symptoms in the group was 55 years, and the average age when sympathectomy was performed was 59 years. This disease, in our experience, is restricted to one or both lower extremities, one of which may be affected more than the other; after varying periods of time, however, both will be involved.

Patients with vascular sclerosis, according to de Takats,[17] may be divided into three clinical groups according to the severity of the disease. Group 1 is com-

posed of patients who have diminished pulsations or none, in the foot and the lower part of the leg. The skin is warm, and the color of the foot may be normal. These patients can walk three to six blocks without claudication. Unfortunately, however, few patients are observed in this early stage of the disease, and those who are seldom believe that their condition is such as to warrant sympathectomy. If any patients in this group suffer, in addition, from angina pectoris or hypertension, the symptoms of claudication may go unobserved and the condition in the extremities may be overlooked, attention being directed to the ischemic syndrome elsewhere. Sympathectomy in this group produces a dramatic effect. The average patient can again walk one or two miles continuously at a good gait without claudication and, in addition, the foot and the lower part of the leg remain permanently warm and dry. Eighteen patients of this group of 61 were observed in this early stage, and the results obtained from sympathectomy were excellent in all.

Group 2 is composed of patients who have trophic changes in the skin and nails of the toes; the toes may be cyanotic (Fig. 5). The feet are pulseless, and ability to walk is restricted to two blocks or less. De Takats[17] has observed that a better prognosis can be given when the feet are moist, as this indicates a heightened sympathetic tone. Twenty-two patients observed were classified in this group. Six months to twelve months after sympathectomy these patients were able to walk from one-half to one mile or more, and their feet became warm and dry as collateral circulation improved (Fig. 6). No amputations were performed in this group, some of whom have been followed for fifteen years.

Group 3 consists of patients who have cold feet which, when dependent, take on a cyanotic hue and become livid when elevated. Osteoporotic changes of bones of the feet, and ulcerations or gangrene of the digits or part of the foot may be present. The pulsations in the femoral and popliteal arteries are extremely weak or absent, and the patients may suffer rather severely from ischemic neuritis when at rest. These patients should be meticulously cared for if there is ulceration or gangrene of the toes or part of the foot; posterior tibial or sympathetic nerve block may precipitate further gangrene. In addition, cardiovascular disease with anginal symptoms, nephrosclerosis and hypertension may be present. If the general condition of the patient will permit and the foot becomes warm and dry after posterior tibial nerve block or block of the lumbar sympathetic chain, sympathectomy may be of definite value and, when there is gangrene of the toes or patchy gangrene, may substitute a metatarsal for a supracondylar amputation. Some patients in this advanced stage, after sympathectomy, have useful extremities; although their feet become warm and dry, their tolerance for exercise is reduced.

Twenty-one patients in this group of 61 were in this advanced stage. Six required amputations at the time of sympathectomy, consisting of removal of one or two toes, metatarsal amputations and, in 2 cases, supracondylar amputations. Of the remaining 13 patients, 7 required amputations of the various types from one to ten years after sympathectomy; however, these patients were very grateful that their amputations could be postponed by sympathectomy.

Unfortunately, the largest number of patients with peripheral vascular sclerosis are seen in the third group. Conditions such as diabetes mellitus, hypertension and lipedema, if not controlled, probably cause progression of vascular sclerosis. When diabetes is present and controlled, frequently the severe pain and paraesthesia of the extremity is relieved by sympathectomy. Patients who have elevated blood cholesterol levels of over 250 mg. per hundred cubic centimeters should be given a high protein, low cholesterol, low fat diet with lipotrophic agents and thyroid extract.

Some patients with arteriosclerotic pe-

ripheral vascular disease associated with diabetic neuropathologic conditions may have ulcers and gangrene, as they are insensitive to pain associated with weight-bearing, which accentuates extension of the ulcer and gangrene. The extremities of other diabetic arteriosclerotic patients may be hot, throbbing, burning and painful to the knee or above, apparently owing to interruption of the myelinated nerve fibers. De Takats[17] has observed that such symptoms are produced by irritation to the nerves and stated that this neuritic phenomenon is accompanied by antidromic vasodilatation as observed in causalgic states.

Causalgic States.—Patients who have suffered injury or infection to an extremity not infrequently have burning pain, paraesthesia, edema and elevation of skin temperature, which may result from contusion, concussion or overstretching of a peripheral nerve. Such a condition may follow Pott's or Colles' fracture, blunt trauma to the part, sprained ankle, fractured or crushed fingers, toes or tarsal bones, or periphlebitis. These symptoms may develop or persist after the initial trauma to the soft tissues and/or bone has healed.[18] At first the symptoms associated with vasodilatation are present; i.e., edema of the parts, rise in temperature and/or burning pain; later vasoconstriction dominates the clinical picture, which causes a sensitivity to cold or pressure over the extremity. The skin undergoes gradual atrophy; it becomes intensively red, cyanotic, dry and scaly, with a glossy thin epidermis, and osteoporosis develops, with trophic change in the nails. De Takats[18a] attributes this to a vasomotor change from a reflex disturbance of the sympathetic nervous system. Patients in this condition, when observed early with minimal symptoms, are relieved by repeated infiltration of the part with 1 per cent procaine hydrochloride solution, which blocks stimuli and inhibits vasodilatation substances, giving the patient a sense of well-being. In instances in which the symptoms are not relieved by local procaine block, the stimulus has extended to a higher level, in which case repeated paravertebral block with 1 per cent procaine solution or sympathectomy is utilized to produce permanent relief. However, sympathectomy is of little value if there are marked permanent changes in the skin, e.g., if it becomes shiny or sensitive to cold, or when osteoporotic changes are present. Sympathectomies were performed on 22 patients in this series who were suffering from causalgic states. Sixteen were male and 6 were female; their symptoms had been present for an average of two years,

Fig. 3, *A and B.*—Buerger's disease of both lower extremities, more pronounced on the left, of two years' duration. Good results followed bilateral lumbar sympathectomy. The feet became warm; normal color returned; moderate exercise was possible without claudication.

and several had been considered malingerers or neurotics. After sympathectomy, 14 showed excellent results; 6 were improved, and 2 obtained no relief. The last-mentioned had been suffering with their disease for a longer period than had the others, and there were marked changes in the skin, subcutaneous tissue and bone. Homans[19] does not advocate sympathectomy if paravertebral block, properly done, does not produce relief of symptoms.

Thrombophlebitis with Lymphedema (Post-Thrombotic Sequelae) of the Lower Extremity.—Acute thrombophlebitis is a frequent and serious complication that may follow major surgical procedures, pregnancy, trauma to the lower extremity, or serious illnesses such as typhoid fever, pneumonia and heart disease. In the past, acute thrombophlebitis frequently left a large percentage of its victims with a swollen, cold, moist extremity that was extremely painful[20] and prone to develop eczematoid areas, trophic ulcers of the lower leg and ankle, and lymphedema. Ochsner and DeBakey[21] observed that these patients, after varying periods of time, showed marked fibrosis of the subcutaneous tissue and skin, with vasospasm always present. Linton[22] observed that, after recanalization of the deep veins, symptoms of edema, stasis dermatitis, stasis cellulitis and chronic ulceration developed. These complications are not a serious threat to the life of the patient, but morbidity is high and the loss of time from work is staggering. During a period of many years various forms of therapy have been developed and utilized, with questionable success. For several years it has been our plan to treat such patients with chronic ulceration, stasis dermatitis and cellulitis, edema, and severe pain by absolute bed rest and elevation of the extremity until the acute symptoms have subsided, after which the patient is subjected to an operative procedure consisting of interruption of the superficial femoral vein in the upper part of the thigh, ligation of the incompetent internal and external saphenous veins, and lumbar sympathectomy on the involved side.

We have found an operative procedure developed and reported by Linton in 1948[23] extremely useful in conjunction with the aforementioned procedure when there is marked fibrosis of the subcutaneous tissue of the lower part of the leg. This operation has given such excellent results that it seems feasible to outline the technic here: A long vertical incision approximately 1 cm. posterior to the tibia is made from the knee to just below the internal malleolus and carried down through the deep fascia. Large incompetent communicating veins arising from the posterior tibial vein are ligated and divided. The dissection is carried anteriorly over the tibia, severing the deep fascia from the bone. The internal saphenous vein, which is observed through the deep fascia, is ligated and excised from the upper and lower ends of the incision by incising the deep fascia. The posterior skin flap is then raised, and the short saphenous vein is removed. A large section of deep fascia is then excised, care being taken to preserve the sural nerve lying parallel with the external saphenous vein. The wound is closed with fine interrupted silk sutures to the skin, and the extremity is covered with a large gauze dressing. A plaster of paris cast is applied from the toes to the knee, permitting the foot to be in 90 degrees of dorsal flexion. After removal of the cast, the patient wears an elastic stocking or bandage for three to six months. If large ulcerations are present, they are excised and the area covered with a split thickness graft from the thigh of the opposite leg.

Good healing of the wound is obtained; the foot becomes warm and dry, and the edema, eczema, cellulitis and pain disappear.

In several cases it was observed that the subcutaneous tissue and deep fascia were extremely firm, indurated, and 2 to 3 cm. thick. With this pathologic picture in mind, the symptoms of pain, lymphedema, ulceration and refusal of ulcers to heal may be readily appreciated, as well

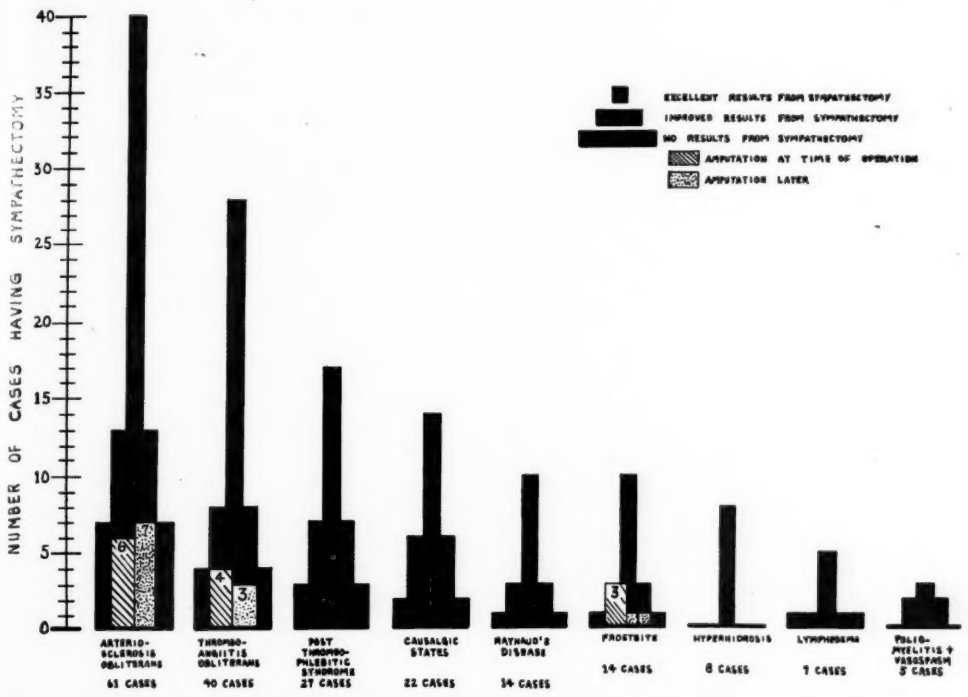

Fig. 4.—Diagram showing results obtained from sympathectomies performed for each type of peripheral vascular disease encountered and initial and later amputations.

as the presence of vasospasm, which impedes proper circulation of the extremity. It is remarkable how quickly pain in such an extremity is relieved by these operative procedures. Twenty-seven patients in this series were observed with the post-thrombophlebitic syndrome; 19 were female and 8 male. The average duration of their disease, after acute thrombophlebitis, was seven years; consequently, sufficient time had elapsed for marked changes to develop in the involved extremity. Seventeen patients in this group showed excellent results; 7 obtained substantial improvement, and 3 showed minimal results. These three, who were operated on several years ago, probably should have had, in addition to ligation and stripping of the veins and sympathectomy, removal of the fibrotic subcutaneous tissue and deep fascia according to the technic of Linton, which we now use in all cases in which there is marked fibrosis of the subcutaneous tissue and deep fascia.

Hyperhidrosis of Nervous Origin.—Hyperhidrosis, in a mild form involving both the upper and the lower extremities, is frequently encountered and is often a part of Raynaud's syndrome.[10] Occasionally patients are observed with massive sweating of either the upper or the lower extremities, or both, to such an extent that there is maceration of the tissues, trophic changes in the skin of the extremities take place, and the patient suffers from repeated colds and infections of the upper part of the respiratory tract. Most investigators are of the opinion that this syndrome is produced by an overactivity of the sympathetic nervous system. In its mild form, in most instances, it responds to medical treatment; e.g., Banthine has been used with good results in patients with minimal disease; however, the more

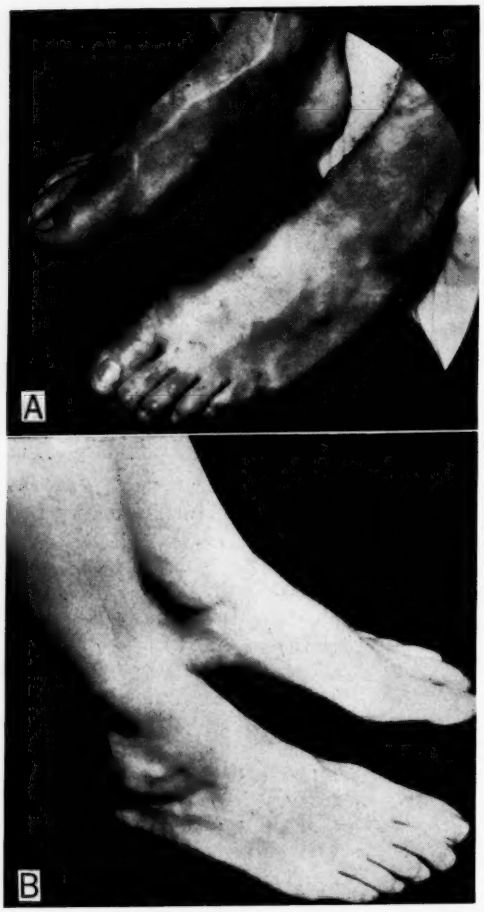

Fig. 5.—*A*, arteriosclerosis obliterans in a 60-year-old man, with marked trophic changes in nails and skin of feet, which were cold and pulseless. *B*, photograph taken one year after sympathectomy. Trophic changes have disappeared; color has returned to normal; claudication on exertion has disappeared.

severe conditions require sympathectomy to effect a cure and restore the patient to normalcy. This disease is observed in both male and female patients and occurs most frequently in a young age group.[5] Eight patients in this series had this disease to such a degree that it prohibited them from pursuing their occupations and required sympathectomy of the upper or lower extremities; their average age at the time of operation was 28 years. There were 5 male and 3 female patients, and all 8 obtained excellent results from sympathectomy. They were followed for an average period of five years after operation, which was so complete that some complained of intense dryness of the tissues; application of skin lotions, however, relieved this condition.

Frostbite.—Frostbite has received increased attention owing to its frequent development in many areas of the country and its prevalence in wartime. A large number of men were discharged from the armed services with residual damage from previous frostbite received during their tenure of service. As Veal has demonstrated, the symptoms are not unlike those of Buerger's disease.[3b] These injuries are circulatory, and it has been shown by numerous investigators[24] that the pathogenesis of frostbite is comparable to that of vasoconstriction, both locally and centrally. From the beginning of exposure to cold there is pronounced alteration in local circulation. If the exposure is brief and the cold not too severe, only blanching of the exposed tissues and temporary vasoconstriction occur, which disappear after removal to warm quarters. However, if the cold is severe enough and vasoconstriction is permitted to persist, thrombosis of the smaller vessels and severe ischemia of the cutaneous, subcutaneous and deeper tissues occur and may result in gangrene. Even though gangrene does not develop, all too frequently there are permanent circulatory sequelae. During the initial period of exposure to cold there is intimal arterial injury, followed by inflammatory hyperemia characterized by sympathetic overactivity and vasoconstriction. Arteriographic and capillary microscopic studies have shown that even during the hyperemic stage the circulation is not full and complete. In addition to the circulatory manifestations, there are neurologic changes, as was emphasized by de Takats,[8a] who demonstrated that there is partial segmental demyelinization of the nerves, with preservation of the nonmyelinated sympathetic fibers. Fre-

quently this results in a crossed interrelation of the fibers, producing vasoconstrictor and vasodilatator phenomena, together with a tense, burning pain originating in the affected or poorly insulated sensory fibers. De Takats has further stated that sympathectomy does not relieve damage to the sensory nerves but eliminates stimulation to the sympathetic system which may be brought on by chill, postural stimuli or emotion.

We utilize sympathetic block in the treatment of acute frostbite as early as the patients come in for attention. Immediately after the sympathetic nerve block to the extremity, the patient has a sense of comfort; the pain disappears, and the extremity becomes warm, but not hot. When there is sufficient damage to the extremity to make gangrene inevitable, there is earlier demarcation of the area which aids in rehabilitation of the patient. In patients who required amputation of either the digits or part of the extremity, sympathectomy hastened the healing process, relieved the patient of any permanent, residual symptoms, and permitted earlier ambulation and resumption of normal activities.

Sympathectomy has also proved valuable for patients with residual symptoms of frostbite, similar to those of Buerger's disease.[25] Fourteen patients in this series were treated with sympathectomy for

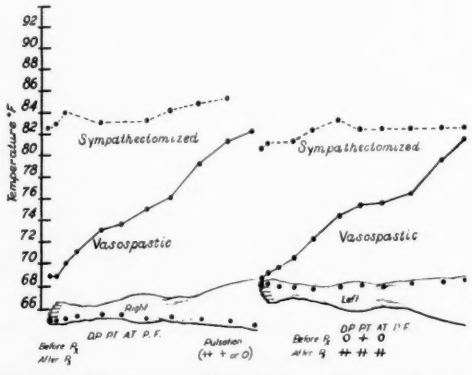

Fig. 6.—Skin temperature chart of patient shown in Figure 5, *A* and *B*. Note excellent response after sympathectomy.

Fig. 7.—Chronic frostbite, right hand. Patient continued to have burning pain in fingers, as well as color and trophic changes, which disappeared after thoracic sympathectomy.

acute frostbite and 5 for residual symptoms (Fig. 7). Of the 9 patients with acute frostbite who had severe involvement, 3 required amputation of one or more digits at the time of admission and 1 required amputation of part of two digits after several months; the remaining parts of these extremities were symptom-free. The 5 patients treated for chronic frostbite whose symptoms simulated those of Buerger's disease were completely relieved of the disease.

Poliomyelitis with Vessel Spasm.—Five patients, 3 male and 2 female, were observed in this series who suffered from unilateral poliomyelitis of the lower extremity. Each of these patients had a cold, painful, cyanotic extremity with erythematous patches and chronic ulcerations that had been unresponsive to any previous therapy.[26] The condition had not been present for more than two years in any case. The average age of the 5 patients at the time of operation was 11 years; 1 female patient was 21 years of

age. Lumbar sympathectomy was performed in all 5 cases; 3 of the patients showed excellent response, and there was marked improvement in the other 2. After sympathectomy, the extremities became warm; vascularity was increased, and ulcerations healed. The sympathectomy had no effect of importance on the motor paralysis. It is our impression that sympathectomy in these cases is of distinct value, especially in children, if the operation is performed before chronic fibrosis occurs and results in persistent edema, which prohibits improvement. De Takats[8a] has emphasized the fact that only patients exhibiting marked vasospasm are suitable for sympathectomy, and the majority of children suffering from poliomyelitis do not show such manifestations.

Acute Arterial Occlusions.—The importance of surgical treatment of the sympathetic nerve in the management of acute arterial occlusions resulting from trauma, embolism, thrombus, or injury to the area of a major vessel, is now appreciated. This phase of peripheral vascular surgery has been discussed in previous communications[27] and will not be dealt with in detail here. When there is a sudden interruption of the blood flow to an extremity, evidenced by diminution or absence of sensation, the extremity becomes cold, pale and pulseless, with severe pain. Frequently, in cases of injuries,[12] i.e., fractures, severe contusions or gunshot wounds occurring in the vicinity of major vessels, all the symptoms of acute arterial occlusion will develop. These patients have increased pain out of proportion to the injury. Unless the vasospasm is released by immediate sympathetic nerve block, gangrene may result. We have used repeated sympathetic nerve block and sympathectomy as soon as the condition is recognized and have found that this procedure invariably relieves pain and permits the tissues to receive an adequate blood supply by relieving the vasospasm and opening sufficient collaterals to maintain the limb and prevent gangrene.

This is illustrated by the synopses of 3 cases.

REPORT OF CASES

CASE 1.—A 14-year-old boy accidentally discharged a 0.410 shotgun while hunting, and the load of shot entered the calf muscles of the left leg. The patient entered the hospital about one hour after the accident, at which time a large part of the calf muscles was found to be shot away; the wound was not bleeding, and the foot was cold and pulseless. A survey of the injury did not reveal evidence of sufficient destruction to the blood supply to produce this cold, pulseless foot and lower leg. A lumbar sympathetic block was done immediately, 1 per cent procaine hydrochloride solution being used. Within fifteen minutes after the block was completed there was profuse bleeding of the wound; the foot and leg became warm and the dorsal pedal pulse became palpable. It was believed that if the vasospasm associated with this injury had not been relieved immediately, irreparable damage to the foot would have resulted, in addition to the damage produced by the wound in the calf muscles.

CASE 2.—A 33-year-old Negro was brought into the emergency room, having been shot through the left thigh with a revolver eight hours earlier. The bullet had entered the thigh in the region of the femoral triangle; the path of exit was in the lower part of the buttock. There was a mass in the region of the wound; the left leg and foot were cold, pulseless and extremely painful. It was thought by the attending physician that the femoral artery had been injured or severed. A lumbar sympathetic block was done immediately, with the use of 1 per cent procaine hydrochloride solution. Twenty minutes later the extremity was warm; there were good pulsations in the popliteal, posterior tibial, and dorsal pedal arteries, and pain had practically disappeared. On exploration of the wound, a large hematoma was found in the region of the femoral artery and vein and only a small arterial twig had been severed by the bullet.

CASE 3.—A woman 56 years of age was observed in consultation one week after abdominal hysterectomy had been performed for a large degenerating fibroid tumor of the uterus. Twenty-four hours before consultation the patient felt severe pain in the right lower extremity below the knee. The right foot and the lower part of the leg were cold, pulseless and livid; the patient was in agonizing pain. Immediate paravertebral sympathetic block was done on the involved side,

Fig. 8.—Sympathetic nerve specimen showing a double trunk and four ganglia of right lumbar sympathectomy.

with 1 per cent procaine hydrochloride solution. Within a short time the pain decreased in the involved extremity, which became warm, and pulsation was detected in the dorsal pedal artery. A diagnosis of embolism at the bifurcation of the popliteal artery into the posterior tibial and peroneal arteries was made. Repeated paravertebral blocks were done daily. The foot remained warm; the pain gradually disappeared; the pulse returned to normal in the dorsal pedal vessel, and as collateral circulation developed the patient recovered with only loss of the toes at their bases.

Prophylactic Sympathectomy of the Uninvolved Extremity. — Not infrequently patients with Buerger's disease, peripheral vascular sclerosis or Raynaud's disease show more involvement in one extremity than in the other.[8a] This is true especially when a lower extremity is involved, in which case careful consideration should be given the uninvolved or the less involved extremity when preparation is made for unilateral sympathectomy. We have repeatedly observed patients who came in with pronounced involvement of one extremity, for which we performed a unilateral sympathectomy with good results only to have the patient return at a later date with marked arterial changes in the unsympathectomized extremity. This occurred most frequently when diabetes mellitus was associated with the degenerative or occlusive arterial disease. It is now our policy to protect the opposite extremity by performing a bilateral sympathectomy if the condition of the patient permits. Otherwise, the opposite side is sympathectomized one or two weeks later.

Contraindications to Sympathectomy.— Sympathectomy should not be considered for patients with diffuse arteriolar disease, marked hypertension, advanced cardiac, cerebral or renal damage, or a pregangrenous condition of an extremity when it is evident that the diseased vessels will not permit adequate circulation. Frequently, in the presence of impending gangrene, the attendant feels that something drastic and dramatic must be done and requests a sympathectomy. Such a procedure is definitely contraindicated, as it frequently contributes to the more rapid development of gangrene. We have had this experience on two or three occasions.

Technic of Operation.—During the past twenty-five years various operative technics have been developed to sympathectomize the upper and lower extremities, and each has been an improvement over the previous ones.

The technic that we now use to sympathectomize the upper extremity is that of Smithwick,[16] which consists of removing the second and third thoracic ganglion and trunk by a posterior approach; excision of the stellate ganglion may be carried out at the same time. Intratracheal anesthesia is used advantageously with this technic.

The technic used to sympathectomize the lower extremities is that developed by Pearl,[28] Flatthow,[29] and Atlas,[30] which is an anterolateral muscle-splitting extra-

peritoneal approach to the lumbar sympathetic ganglion and chain.[31] Removal of the second, third and fourth ganglion and trunk usually suffices (Fig. 8). It was formerly taught that, after removal of the first lumbar ganglion, the power of ejaculation in the male is lost; we have found however, that this is not true. Bilateral lumbar sympathectomy can be performed without hesitation on patients in good condition up to 55 or 60 years of age. On older patients, when both extremities are in need of sympathectomy, the operations are performed in two stages at five-day or six-day intervals.

Complications.—In a generous experience with both thoracic and lumber sympathectomies, we have encountered few complications. There have been no operative deaths, no serious infections. In a few cases hematomas have developed in the wounds. The patients are usually out of bed, even those on whom bilateral lumbar sympathectomy has been performed, on the day following the operative procedure. We have observed, in about 20 per cent of our cases, the development of dull pain four or five days after the operative procedure in the anterior surface of the thigh; this may persist from a few days to four or five weeks, after which it completely disappears. We are at a loss as to the origin of this complication;[3] it is not severe; a mild sedative will control it, and it does not prevent the patient from being discharged from the hospital at the end of five or six days. It is notable that the pain becomes more prominent at night and is relieved by activity, in contrast to the characteristic pain of claudication.

SUMMARY

The modern concept of the treatment of peripheral vascular disease had its origin in 1924 and 1925 after the work of Royle, Adson and Brown, who utilized sympathectomy for vasospastic conditions.

Careful history, physical and laboratory examinations are utilized to aid the surgeon in selecting patients for operation whose peripheral circulation will be improved by sympathectomy.

One hundred and ninety-eight patients have ben sympathectomized for various peripheral vascular diseases, and the results of 304 sympathectomies are given.

SUMÁRIO

O conceito moderno para tratamento das doençaas vasculares perifericas teve sua origem em 1925 e 1925, após os trabalhos de Royle, Adson e Brown que preconizaram a simpaticectomia. Uma historia-cuidadosa, exames fisicos e laboratoriais, são usados para auxiliar o cirurgião em selecionar os doentes para a operação, cuja circulação periferica deverá sêr improvisada pela simpaticectomia. 198 doentes doram simpaticectomizados por varias afecções vasculares perifericas, sendo ainda apresentados os resultados de 304 operados outros.

RESUMEN

El concepto moderno del tratamiento de la enfermedad vascular periférica tuvo su origen en 1924 y 1925 después del trabajo de Royle, Adson y Brown, quienes utilizaron la simpaticectomía para los estados vasoespásticos.

El cuidadoso estudio clínico (interrogatorio, exploración física y exámenes de gabinete y laboratorio) ayuda a la selección de pacientes, en quienes la circulación periférica puede mejorarse con la simpaticectomía.

La simpaticectomía se efectuó en 198 pacientes por varias enfermedades vasculares periféricas. Se dan los resultados de 304 simpaticectomías.

RIASSUNTO

I concetti terapeutici moderni nella cura delle malattie vascolari periferiche hanno avuto inizio nel 1924-25 dopo i lavori di Royle, Adson e Brown, i quali si servirono della simpatectomia per curare le affezioni con vasospasmo.

Anamnesi accurata, ricerche, fisiche e

di laboratorio, servono per scegliere fra i pazienti da operare quelli in cui il circolo periferico potrà giovarsi della simpatectomia.

198 malati sono stati operati di simpatectomia per affezioni vascolari varie; vengono presentati i risultati di 304 simpatectomie.

RÉSUMÉ

C'est en 1924 et 1925 que Royle, Adson et Brown, en pratiquant la sympathectomie pour des vasospasmes, furent les premiers à traiter les lésions vasculaires périphériques. 198 patients subirent la sympathectomie; les auteurs donnent les résultats de 300 cas avec leur procédé d'examen et de diagnostic.

ZUSAMMENFASSUNG

Die moderne Auffassung von der Behandlung peripherer Gefaesserkrankungen geht auf die Arbeiten von Royle, Adson und Brown aus den Jahren 1924 und 1925 zurueck, die sich der Sympathektomie in Faellen von vasospastischen Erkrankungen bedienten.

Zur Auswahl der Kranken, deren peripherer Blutkreislauf durch Sympathektomie verbessert werden soll, muss der Chirurg eine sorgfaeltige Krankheitsgeschichte und physikalische und Laboratoriums-untersuchungen heranziehen.

198 Kranke wurden wegen verschiedener peripherer Gefaesserkrankungen der Sympathektomie unterzogen. Die Ergebnisse von 304 Sympathektomien werden vorgelegt.

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Intracardiac Surgery with Hypothermia

BRIAN A. COOKSON, M.B., CH.B. (EDIN.), WILFRED NEPTUNE, M.D., AND CHARLES P. BAILEY, M.D., F.A.C.S., F.I.C.S.

PHILADELPHIA

DIRECT intracardiac surgery presents a problem which most investigators feel will be answered by the use of a mechanical heart and oxygenator, allowing the blood to by-pass the heart. On the basis of previous experimental work,[1] we feel that a safer and more simple method is provided by hypothermia, since the resulting hypometabolism allows an increase in time for stopping the circulation, opening the heart, and performing definitive surgical on the valves and septums.

Bigelow and his associates[2] demonstrated that when a dog's body temperature is dropped from 38 C. (100 F.) to 20 C. (68 F.) metabolism and the oxygen demands of the body are reduced to approximately 18 per cent of their normal values. They further demonstrated that the use of hypothermia, provided it is suitably induced and does not go lower than 20 C., is a comparatively safe procedure. A markedly reduced metabolism at 20 C. suggested to them that the circulation could be safely stopped for a far longer period than is possible at normal temperature.[3] In order to check this, they demonstrated that dogs can survive occlusion of both the superior and the inferior vena cava for at least fifteen minutes without damage to the brain. Furthermore, they showed that cardiotomy of the left auricle could be performed, with survival, under these conditions. Unfortunately, the percentage of survival in 39 such experiments was only 15. Forty-nine per cent of the animals died owing either to ventricular fibrillation or to cardiac arrest during occlusion of the cavae or shortly after caval occlusion was relieved. Of the animals revived to normal temperature, 70 per cent died of shock within twelve hours.

We repeated the work of these investigators, with several modifications, and evolved a standard procedure which enabled us to occlude the cavae for twelve minutes and perform cardiotomy on either the right auricle or the right ventricle with a survival rate of 85 per cent.

Technic.—A nonfasting dog is premedicated with morphine sulfate, 1 mg. per kilogram of body weight, and atropine sulfate, 0.04 to 0.08 mg. per kilogram, subcutaneously administered. Thirty minutes later the dog is anesthetized with 30 mg. per kilogram of intravenous sodium pentothal. An endotracheal tube is then inserted, and a needle for intravenous therapy is placed in one of the veins of the right front leg. Digitoxin, 0.014 mg. per kilogram, and thiamine hydrochloride, 100 mg., are given intravenously. The animal is placed on its left side in a cold chamber* with air circulating by means of a fan at approximately minus 4 C. (25 F.). Padding is provided to prevent contact with cold metal. Respiration is controlled by means of a preophore respirator** supplying 100 per cent oxygen. The virtue of the preophore respirator is that it can be used automatically, either as a supply and demand system when the animal is breathing "on its own" or as an artificial respirator when breathing has ceased. In addition to these measures, the animal receives 1,000,000 units of soluble penicillin, 8 Wilson units of ACTH, and 50 per cent

From the Experimental Surgical Laboratory of the Division of Surgery, Department of Thoracic Surgery, Hahnemann Medical College and Hospital, Philadelphia, Pa.

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*Victor Beverage Cooler.

**Obtained from the Mine Safety Appliance Co., Pitt., Pa.

dextrose intavenously, 1 cc. per kilogram of body weight. During the induction of hypothermia, if marked bradycardia occurs, an additional dose of atropine is given.

The animal is now periodically observed. Whenever shivering is noted, 50 mg. of sodium pentothal is given intravenously. After two and a half to three and a half hours, the rectal temperature has usually dropped to 26 C. (79 F.). The animal is removed from the cold chamber and prepared for operation.

The chest is opened through the fifth right intercostal space. Collapse of the lungs, to any degree, is scrupulously avoided by keeping them almost fully inflated and handling them gently. Immediately after the chest is opened, 10 cc. of 1 per cent procaine hydrochloride is injected into the pericardial sac. The azygos vein is then ligated, and umbilical tapes are placed loosely about the superior and inferior vena cavae without occluding them. The pericardial sac is opened and the heart is exposed. Four silk stay sutures are placed in the wall of either the right ventricle or the right auricle to allow traction and conrol of the incision to be made subsequently in the wall of the heart.

The cavae are now occluded with vascular clamps, and an incision is made in the wall of the heart. The edges of the incision are retracted by pulling on the stay sutures; this gives one an excellent view of the chamber under treatment. The small quantity of blood present is easily removed, either by suction or with gauze. The blood slowly reaccumulates as it trickles sluggishly out of the coronary sinus. Closure of the incision is rapid and simple. Two layers of silk sutures are used; the first layer consists of a continuous everting mattress suture, and the second layer of a continuous running whipstitch.

After twelve minutes of caval occlusion the superior vena cava is unclamped, and 0.6 mg. per kilogram of Benodaine,* (a short-acting adrenolytic drug) is injected into the cavity of the right ventricle. The surgeon refrains from all intrathoracic manipulation and closely observes the heart, checking the rhythm and the rate. One and one-half minutes after the Benodaine has been given, the inferior vena cavae is partially opened. After an additional two or three minutes the inferior vena cava clamp is completely removed. The pericardial sac is resutured. A drainage tube, connected to water-seal suction, is left in the chest; the lungs are fully inflated, and the chest is closed. During the operation, the blood pressure is maintained by repeated small doses of Vasoxyl, given intravenously.

The animal is placed on a warming table and covered with an electric blanket. The dose of penicillin and dextrose is repeated. Rewarming to normal body temperature is arranged to take approximately three hours, during which time 100 per cent oxygen is continuously supplied. When the animal shows signs of returning consciousness, which coincides approximately with the return to normal body temperature, the endotracheal and chest drainage tubes are removed, a final dose of dextrose is given, and the animal is placed in a comfortable place and left for the night. Next day the animal is given 200,000 units of depot penicillin, and on the subsequent day is returned to the animal house.

The condition of the dog throughout the experiment is evaluated by a careful study of tongue color and reflexes. Ideally, immediately before caval occlusion, the tongue is bright red, the pupils are small, and the conjunctival and deep tendon (knee) reflexes are present. At the end of 12 minutes of caval occlusion, the tongue is moderately anemic and cyanotic, the pupils are fully dilated and the reflexes are absent. The tongue becomes bright red again, and the pupils return to their former size in twenty minutes after the release of the superior vena cavae clamp. The conjunctival reflex is

*Benodaine is ((2—(1—Piperidylmethyl)—1, 4—Benzodioxan Rydrochloride Merck)). Supplied by Merck and Co., Rahway, New Jersey.

back in forty-five minutes and the knee jerk in sixty minutes. A delayed return of reflexes is a bad prognostic sign.

COMMENT

If the aforedescribed measures are employed, it is found that the heart is still beating strongly at the end of the period of caval occlusion. After the superior vena cava is unclamped, Benodaine is withheld until it is ascertained that the heart is beating satisfactorily (32 beats per minute or more) and is showing no signs of heart block.

If a diagnosis of heart block or unsatisfactory heart rate (less than 32 beats per minute) is made, it should be made not earlier or later than two minutes after the clamp is removed from the superior vena cava. One cc. of fresh 1:4,000 epinephrine, prepared in advance, should be immediately injected into the right ventricle and the heart gently massaged. If the heart does not respond in one and a half minutes, it is continuously massaged for five minutes or more and the inferior vena cava clamp removed. Usually, however, the heart promptly responds, in which case, once the heartbeat is well established (i.e., 40 beats per minute), Benodaine is given and the opening of the inferior vena cava clamp is commenced one minute later.

Ventricular fibrillation is a frequent complication of the treatment of cardiac arrest with epinephrine. It also frequently occurs in the hot, humid summer months when the ventricles are handled or incised. This latter type of fibrillation was not observed in the winter months. No difficulty is experienced in defibrillating these hearts, provided it is done immediately. With an efficient team, less than thirty seconds should elapse between the onset of fibrillation and the application of an electric shock to the ventricles. If the heart is not defibrillated in two attempts, 1 cc. of 1: 4,000 epinephrine is injected into the left ventricle, the heart is vigorously and effectively massaged for one minute and electric shock is again tried.

Results.—Of the 11 dogs in which this technic was used for cardiotomy of the right ventricle, only 1 showed ventricular fibrillation. This is in sharp contrast to Bigelow's results, in which the reported incidence of ventricular fibrillation was as high as 36 per cent. (Bigelow's report does not enumerate those fibrillations which were successfully defibrillated.) In our preliminary experiments, in which the adrenolytic drug Benodaine was not used, ventricular fibrillation commonly occurred after the caval occlusion was relieved.

The sequence of events without Benodaine was usually as follows: At the end of the period of occlusion, the heart was still beating at a slow rate. After relief of the occlusion the heartbeat became rapid and vigorous, and shortly thereafter was converted into ventricular fibrillation. This typical picture was reminiscent of the effects of a large dose of epinephrine.* It was then realized that during the occlusion of the cavae, owing to anoxia, a discharge of epinephrine from the adrenal medulla was pouring into the clamped-off inferior vena cavae. The fibrillation that followed release of the clamps might therefore very probably be due to large quantities of accumulated epinephrine reaching the anoxic heart. The fact that use of Benodaine has almost eliminated this type of fibrillation lends strong support to this supposition. In fact, the only dog in the series of 11 in which fibrillation occurred was one that did not receive Benodaine until after the inferior vena cavae was unclamped.

The next significant fact is that only 1 of the 10 dogs that survived the operation died postoperatively, whereas 70 per cent of Bigelow's surviving animals died of shock. It is well known that delayed death due to either pulmonary edema or shock frequently follows a prolonged interruption of the circulation. The occlusion of the cavae for only twelve instead of fifteen minutes and the avoidance of

*We are indebted to Dr. Nicholas Dryer for this suggestion.

ventricular fibrillation has no doubt given us an advantage in this respect.

In addition to this consideration, we took certain positive measures to combat shock and pulmonary edema:

1. The use of 50 per cent dextrose IV.
2. Adequate ventilation with 100 per cent oxygen during the entire period of unconsciousness.
3. The use of sedative premedication to reduce the dose of pentothal necessary for anesthesia.
4. Avoidance of pulmonary collapse and pneumothorax by:
   (a) Avoiding the use of animals with obvious respiratory infections.
   (b) Adequate atropine premedication to prevent the unusually copious bronchial secretions normally occurring during hypothermia.
   (c) Operating with the animal's lungs almost fully inflated.
   (d) Leaving a drainage tube in the chest.
5. Avoidance of infection by: (a) liberal doses of penicillin prophylactically, and (b) observing the rules of asepsis.
6. Routine reassurance against thiamine deficiency.
7. The use of ACTH.

Possibly the use of the adrenolytic drug Benodaine should be included on this list, although it was not intentionally used for this purpose.

The 2 deaths, 1 of which occurred postoperatively and the other during the operation, were due primarily in the one case, to severe heart block following twelve minutes of caval occlusion and, in the other, to cardiac arrest, which also followed caval occlusion. In the first animal, no attempt was made to relieve the heart block for a period of thirty minutes. The ventricles were contracting weakly at an average rate of 20 per minute (normal rate at 26 C. is 60 per minute). Finally, cardiac massage was carried out; the heart block disappeared, and the ventricles beat forcefully at a rate of 48 per minute. This animal died twenty-one hours later of shock. There is no doubt that the administration of Benodaine helped only to accentuate the heart block. The logical procedure would have been to give the heart a small dose of epinephrine. This was tried in the case of the animal with cardiac arrest: Benodaine was withheld, and the animal's own epinephrine was administered by opening the inferior vena cava clamp. Once the heart had resumed its beat, Benodaine was given. Unfortunately, this heart fibrillated, and we were not able to defibrillate it successfully.

Of the 9 survivors in this series, one dog showed signs of gross neurologic damage. On the seventh opstoperative day this dog walked in clockwise circles with a stamping gait and bumped into objects as if blind. In another week these symptoms were much ameliorated and the dog was quite responsive. Another dog showed behavior which was suggestive of transient neurologic damage. This animal did not attempt to walk until seventy-two hours after the operation (the majority walked within twenty-four hours); but, apart from very great weakness, the gait was normal. In two more days the animal, aside from being lazy and not very responsive, behaved like a normal dog. Both of these animals were febrile (40 C.; normal temperature, 38 C.) for the first twenty-four hours after the operation, and the possibility of distemper cannot be absolutely ruled out. All the remaining animals appeared normal in every respect except for 2 additional dogs which showed a transient postoperative inequality of the pupils.

After this initial series of 11 experiments, we performed 8 cardiotomies on the right ventricle, with 1 death, and 8 cardiotomies on the right auricle, with 1 death. Both deaths occurred many hours after the operation. One was due to gross hemorrhage, and the other was unexplained except that the operation was complicated by damage to a small portion of lung which had to be repaired.

Subsequent Experiments.—Having im-

proved the technic for caval occlusion at 26 C. for twelve minutes, we wished to work at lower temperatures for longer periods of time. In our nonsurgical experiments on hypothermia alone, we had noted that below 20 C. the heart suddenly changed its rhythm and became very slow, dropping from an average rate of 30 per minute to 5 or 6. This was usually, but not invariably, concomitant with a change from sinus to nodal rhythm. Shortly after this the tongue became paler and the pulse weak or impalpable. This common occurrence discouraged us from performing any operation at these temperatures. However, quite by chance we discovered that if 100 mg. of WIN 2173 was injected intravenously the heart would revert to its normal rate of 30 and the pulse would again become palpable.[4] This effect would last for thirty to forty-five minutes, after which another dose became necessary. Making use of this discovery, we operated on 5 dogs at 17 C., occluding the venae cavae in each case for thirty minutes and opening the right auricle for approximately twenty minutes. Two animals survived this treatment and were perfectly normal. One animal was killed accidentally, and 2 died of ventricular fibrillation. These were preliminary experiments, but it is our opinion that, if necessary, a survival rate similar to that reported could be obtained with perseverance. The most encouraging fact is that in each instance, the heart kept beating throughout the thirty minutes of caval occlusion. It was also interesting to note that the pupils did not dilate at this temperature.

We also realized that hypothermia would give us sufficient time to remove a dog's heart and lungs and substitute those of another dog. Such a procedure was successfully accomplished in 3 experiments. Both donor and recipient dogs were cooled to 24 C., and a technic was devised by which the substitution could be made in less than fifteen minutes. In the most successful of 3 such experiments, which are reported elsewhere,[5] the animal survived for six hours after the substitution, with a normal electrocardiogram (i.e., normal for 24 C.) and return of reflexes and spontaneous respiration.

Repair of Defects.—At present we are devoting most of our efforts toward definitive surgical procedures as applied to defects of the valves and septums, since our preliminary experiments would seem to offer a satisfactory survival rate in the experimental animal. We have successfully produced and repaired interauricular septal defects under direct vision. In addition, we have opened the outflow tract of the right ventricle and transected the pulmonic valves, with subsequent repair of the valves by suture anastomosis. Several times, we have transected the papillary muscles of the tricuspid valve and resutured them without subsequent difficulty. We have had difficulty with interventricular septal defects, since the production of a defect, in our experience,[6] is frequently followed by arrhythmia with subsequent ventricular fibrillation. Moreover, the ventricular fibrillation, in these cases, has proved resistant to all attempts at defibrillation. It is our opinion that the conduction system is damaged after the production of such a defect. In a clinical case with the defect present, however, this problem would probably not be encountered.

Our chief problem in handling interatrial septal defects has been presented by air embolization, particularly occlusion of the coronary artery by air emboli. At present our management appears satisfactory. After the auricular cardiotomy, a vascular clamp is applied to the outflow tract of the left ventricle. By this maneuver, the partial circulation from the left side of the heart is stopped; the danger of peripheral air embolization, as such, is abolished. After the left ventricular outflow tract has been clamped, the interauricular septum is located and as large a section as possible is excised; proof is obtained by finger palpation, by the passage of probes through the defect into the pulmonary veins, and by the appearance of bright red blood from the left auricle. The defect is then closed by a running suture of

silk. As the defect is closed, the right auricle is flooded with saline solution to displace any air from the left auricle (which is dependent), and after complete closure the clamp is removed from the outflow tract of the left ventricle. The right auricle is again filled with saline solution to displace as much air as possible from the right side of the heart, and, by appropriate management of the stay sutures in the auricular wall, the cardiotomy is closed by means of a vascular clamp and the superior vena cava clamp is removed. While the heart is establishing a partial circulation and improving, the auricular incision is closed and the auricular clamp is removed. Benodaine may be given after removal of the superior vena cava clamp; and by the time the auricular incision is repaired, the inferior vena cavae clamp can be removed and complete circulation restored.

In addition to the animal work, the authors have operated upon 6 human patients under hypothermia for various intracardiac conditions up to the time of submitting the corrected manuscript of this paper. Abstracts of the 6 cases follow. It is to be pointed out that this is a very early pioneering effort which may point the way to more successful application in the future.

However, on the basis of these results, we are willing to state that the great danger of systemic (and coronary arterial) air embolism attendant upon open operations for atrial septal defects (since the two auricles are exposed to the atmosphere simultaneously) will probably contraindicate any further such efforts. Closed atrio-septo-pexy, as previously reported,[12] seems immeasurably simpler and safer for the correction of such defects.

A second important observation is that the deteriorated myocardium of long-standing adult cardiac disease (especially of the acquired types) does not well tolerate hypothermia, which is essentially a myocardial depressant.

In summary, we now feel that the chief use of hypothermia is in the treatment of children (and perhaps young adults) with congenital heart disease of a type not suitable for surgical correction by previously applicable technics.

Atrial septal defects would, therefore, be excluded from the field of hypothermic applicability.

Ventricular septal defects and various forms of pulmonic obstruction would seem eminently suitable for the hypothermic approach.

The possibility of definitive correction of most if not all cases of complete transposition of the great arteries would seem to be substantiated by the dramatic operative accomplishment in Case 6.

CASE 1.—H. D., a 30-year-old white woman, entered the Hahnemann hospital with a diagnosis of interatrial septal defect. The diagnosis was based upon catheterization studies performed in another hospital, and the presence of a left-to-right shunt had been demonstrated.

An exploratory cardiotomy was performed through a right thoracotomy, and a persistent ostium primum was found. Since this type of defect was not judged feasible for repair by the atrioseptopexy technic, the thorax was closed. The patient made an uneventful recovery.

In view of her progressive cardiac symptoms, it was decided to attempt repair by direct vision with the aid of hypothermia. On Aug. 29, 1952, with the patient under hypothermia, operation was performed. The rectal temperature was reduced to 81 F. A right thoracotomy was performed. With the technic previously described, the circulation was stopped and the right atrium opened. A large defect, for practical purposes amounting to a single combined right and left atrium, was observed. An attempt was made to close the defect by suturing the anterior and posterior walls together. At completion of the procedure ventricular fibrillation developed; the atrium was repaired, and cardiac resuscitation was instituted and continued until complete cardiac standstill developed.

CASE 2.—J. S., an 11-year-old white girl, entered the Hahnemann hospital with a history of a heart murmur since birth. She had

exhibited easy fatigability and syncope. There was history of cyanosis. Preoperative studies revealed the presence of an interatrial septal defect with a left-to-right shunt. In view of her relatively small size and the chance of encountering a persistent ostium primum, operation with the aid of hypothermia was planned.

This procedure, with induced hypothermia, was performed on Sept. 19, 1952. The rectal temperature was reduced to 88 F. The heart was explored by intracardiac digital examination, and a large central interatrial septal defect with transposition of the right pulmonary veins was observed. Owing to the existence of a greatly enlarged right atrium, repair by the modified atrioseptopexy technic, was deemed feasible, and the heart was not opened for direct observation. Repair of the defect was accomplished.

The postoperative condition of the patient was excellent and she was discharged sixteen days after the operation. At the time of discharge she had no cardiac symptoms and no abnormal heart sounds.

CASE 3.—N. S., a 31-year-old white woman, entered the hospital with progressive dyspnea, orthopnea and fatigability of three years' duration. Preliminary studies revealed advanced mitral insufficiency. In view of her progressive deterioration, surgical intervention was advised. Since she was considered a very poor operative risk, hypothermia was suggested. It was speciously argued that the slowing down of the patient's functions would be relatively the same as greatly speeding up the operation.

Operation, with the patient under hypothermia, was performed on September 29. The rectal temperature was reduced to 78 F. operation. An anterior mitral commissurotomy was performed and the posterior commissure, the site of a Grade IIII regurgitation, was repaired by commissurorrhaphy (suturing the valve leaflets together). At completion of the intracardiac operation (under closed, digital, intracardiac technic), there was cardiac arrest. After massage, ventricular fibrillation developed and was resistant to all attempts at resuscitation. Before the thorax was closed, the left atrium was explored and a large clot was found, which had not been present before the beginning of the intracardiac procedure. This has not been observed previously, and is difficult to explain on the basis of hypothermia, since clotting is decreased at reduced temperatures. Whatever the mechanism, it is our opinion that the large intracardiac clot contributed to the onset of the cardiac arrest and ventricular fibrillation and accounted for failure of resuscitation. However, the evident weakening of cardiac contractions even before the definitive into cardiac operation was begun suggests that the damaged myocardium had been severely depressed by the hypothermia.

CASE 4.—S. G., a 12-month-old white girl, entered the hospital for evaluation. She had required resuscitation at birth, and her development had been retarded. On examination she appeared normal in size but was extremely cyanotic (in oxygen tent) and weak; she appeared *in extermis*. She had never been able to sit up without assistance or to hold a bottle. During the preoperative period she was unconscious most of the time. In view of her critical condition, definitive studies (cardiac catheterization and angio-cardiographic studies) were deferred; and operation under hypothermia was advised in the hope that a corrective procedure might be possible.

Operation was performed on Oct. 3, 1952, with the patient under hypothermia. The rectal temperature was reduced to 80 F. At operation, a diagnosis of the Tetralogy of Fallot was made, and typical infundibular stenosis was noted. The infundibular stenotic obstruction was removed with a modified pituitary forceps, and the child's condition immediately improved.

The postoperative condition was excellent; and at the time of discharge, eleven days after the operation, there was no cyanosis, and the child was able to stand alone.

CASE 5.— E. K., a white boy aged 10 months, entered the hospital with a diagnosis of transposition of the great vessels. The child had been cyanotic since birth, and previous cardiac catheterization had established the diagnosis.

On Nov. 7, 1952, with the baby under hypothermia, an operation was performed. The rectal temperature was reduced to 78 F. A right thoracotomy was performed, and a typical transposition of the great vessels was observed; both coronary vessels came off the artery arising from the right ventricle. In view of the origin of the coronary arteries, production of an interatrial septal defect was proposed. The circulation was stopped, and the right atrium opened. No septal defect was present, so a defect of a size sufficient to admit one finger, was made in the region of the closed foramen ovale. The atrium was

then closed. However, the heartbeat never became strong in spite of all stimulation, including massage. After about forty minutes ventricular fibrillation developed, which resisted all attempts at cardiac resuscitation.

CASE 6.—K. C., a Negro boy 7 months old, entered the hospital with the history of cyanosis since birth. A diagnosis of pulmonary stenosis and patent foramen ovale was made, based upon cardiac catheterization. Angiocardiographic studies were not done.

On Nov. 10, 1952, under hypothermia, operation was performed. The rectal temperature was reduced to 71 F. An anterior bilateral thoracotomy, with transection of the sternum through the fourth intercostal space, was performed. A transposition of the great vessels was observed. However, the right coronary artery arose from the aorta from the right ventricle, and the left coronary artery arose from the pulmonary artery from the left ventricle. In view of the normal location of the left coronary artery, repair of the transposition was proposed.

Both great arterial vessels were mobilized and clamped between Potts toothed vascular forceps. Return circulation from the inferior vena cava was stopped to prevent overfilling of the cardiac chambers, and the great vessels were transected. The great vessels were then repaired by suture anastomosis, the aorta being attached to the left ventricle and the pulmonary artery to the right ventricle. The entire time of cessation of circulation was twenty-two minutes. At completion of the repair, ventricular fibrillation developed, which was corrected by massage only. A good heartbeat was obtained; the thorax was closed, and rewarming was instituted. A normal electrocardiagram was obtained, and spontaneous respiration developed when the child was rewarmed to a rectal temperature of 80 F.

Recovery was rapid and satisfactory, and within three hours the child was awake and crying. Twenty-four hours later he continued to make good progress. Unfortunately, however, cardiac arrest developed during a routine bronchoscopic procedure, and the child died. Autopsy revealed the fact that both coronary arteries arose from the pulmonary artery. It is our opinion that, had it not been for this unfortunate accident during bronchoscopy the child would have survived.

COMMENT

In view of these highly encouraging results, it is justifiable to consider the feasibility of performing cardiac operations on the human patient under hypothermia. For several reasons, hypothermia seems unusually well suited to the problem of congenital heart disease in infants; first, the majority of congenital lesions can be approached from the right side of the heart; second, infant mammals are much less sensitive to hypothermia and asphyxia than are more mature animals;[7] and third, infants, being small, can more readily be cooled and rewarmed.

In the use of hypothermia for cardiac operations on man, it would be logical to cool the patient to 26 C. (79 F.), as there are several instances on record of human toleration of this temperature.[8] In most of the observations made on man, it is reported that auricular fibrillation frequently occurs at this temperature.[8a] The patients were not, however, given artificial respiration with oxygen and were only lightly sedated. Heavier sedation and ventilation with 100 per cent oxygen may well prevent the occurrence of auricular fibrillation or arrhythmia.

The hardest question to answer is: How long can one safely occlude the venae cavae in hypothermic human patients? In seeking an answer to this question, various facts should be considered. It is the consensus that an adult man can usually survive, without harm, a maximum of three to four minutes of absolute circulatory arrest at normal body temperature. Caval occlusion is not, however, the same thing as absolute cardiac arrest; a small residual circulation is still maintained by the left side of the heart, as evidenced by a continual flow of blood from the coronary sinus and by the presence of a weak pulse in the carotid artery[9] throughout the twelve minute tie-off period in a dog at 26 C. This leads to the supposition that a human being might tolerate satisfactorily six minutes of caval occlusion at normal body temperature. Templeton and Gibbon[10] demonstrated that dogs at normal temperature could tolerate nine minutes of caval occlusion. Of 19 animals, 7 died and 3 showed gross

neurologic damage. This should be contrasted, perhaps, with our series of 27 animals with twelve minutes' occlusion at 26 C., in which there were 4 deaths and 1 instance of gross neurologic damage. Probably eight minutes is a more satisfactory period for caval occlusion in a dog at normal body temperature. In that case, hypothermia at 26 C., would safely allow a dog a 50 per cent increase in occlusion time. Applying the same rule to man would indicate nine minutes as being safe at 26 C. At present there are reports in the literature of caval occlusion used for intracardiac surgical procedures in man,[11] but the duration of occlusion was brief and would not be sufficient to allow definitive operations on the valves or septums.

SUMMARY

The authors describe a series of experimental studies of dogs on which open intracardiac operations were performed with the use of hypothermia, stating that it is possible, by lowering the temperature of the dog to a level of 75 to 80 F., to obstruct completely the entrance of blood into the right atrium (by occlusion of the venae cavae) for periods of fifteen to twenty minutes without damage either to the viscera or to the central nervous system. The cardiac chambers are thus laid open for the performance of any chosen intracardiac operation under direct vision.

RÉSUMÉ

Les auteurs expriment leur opinion de la chirurgie cardiaque du chien à l'aide de l'hypothermie, 75 à 80° F. De cette façon, on peut, pendant, 15 à 20 minutes, pratiquer l'obstruction complète de l'ondée sanguine sans causer de dommage.

ZUSAMMENFASSUNG

Die Verfasser beschreiben eine Reihe von experimentellen Untersuchungen an Hunden, die offenen Operationen innerhalb des Herzens unter Anwendung des Abkuehlungsverfahrens unterzogen wurden. Es wird behauptet, dass es durch Herabsetzung der Koerpertemperatur des Hundes auf 23,9 bis 26,6 Grad Celsius moeglich ist, das Einfliessen des Blutes in den rechten Vorhof (durch Verschluss der Hohlvenen) fuer Zeitraeume von 15 bis 20 Minuten voellig abzusperren, ohne dass es zu einer Schaedigung der Eingeweide oder des zentralen Nervensystems kommt. Auf diese Weise koennen die Herzkammern fuer die Ausfuehrung jeder beliebigen Operation innerhalb des Herzens unter direkter Beobachtung des Auges freigelegt werden.

RIASSUNTO

L'autore descrive un gruppo di ricerche sperimentali in cani, nei quali vennero eseguiti interventi intracardiaci a cuore aperto mediante l'uso della ipotermia; le esperienze dimostrano che è possibile, abbassando la temperatura del cane al livello di 24-27°C., interrompere completamente l'afflusso sanguigno all'atrio destro, chiudendo le cave, per periodi di 15-20 minuti, senza danno ai visceri o al sistema nervoso centrale. La cavità del cuore vengono, quindi, mantenute aperte per eseguire qualsiasi intervento intracardiaco sotto il controllo della vista.

RESUMEN

Se describe una serie de estudios experimentales en perros, en los que se efectuaron operaciones intracardíacas abiertas con el uso de hipotermia, afirmando que es posible, por descenso de la temperatura del perro a un nivel de 75 a 80 F (23.89 a 26.67 C) impedir completamente la entrada de sangre a la aurícula derecha (por oclusión de las venas cavas) por períodos de 15 a 20 minutos sin daño para la víscera o el sistema nervioso central. Así se dejan abiertas las cavidades cardíacas para efectuar cualquiera operación intracardíaca de elección bajo visión directa.

SUMÁRIO

São descritos vários estudos experimentais processados em cães, em os quais intervenções intra-cardiacas foram processadas, após a aplicação de hipotermia.

Concluem os autôres sêr possivel, pelo abaixamento da temperatura do cão ao nivel de 75 a 80° F, evitar ou obstruir completamente a entrada de sangue no coração direito, pela oclusão da vêia cava, o que é possivel num periodo de 15 a 20 minutos, sem qualquer perigo para o sistêma nervoso central. A cavidade cardiaca é assim deixada aberta para a pratica, sob visão direta, de qualquer intervenção.

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Suite 2, 1701 West Broadway

Vancouver 9, B. C., Canada

The Plastic Esophagus

EDGAR F. BERMAN, M.D., F.A.C.S.
BALTIMORE, MARYLAND

CARCINOMA of the esophagus is still one of the most dreaded diseases extant. Although some progress has been made in operative technic and the adjuvant measures generally applicable to surgical treatment have been used to their fullest in combating this disease, the number of five-year cures, even in the hands of the best surgeons, is negligible. A heavy pall of defeatism hangs over this subject in the best clinics in the world today, and it is obvious that the problem will not be easily solved.

The reason for this is that the disease is characterized by the unfortunate combination of a rapid extension in elderly, malnourished patients with symptoms that become obvious only after the disease has practically passed its natural boundaries. The cure is further hampered by the fact that this disease attacks an organ that is adjacent to the most vital structures in the body, limiting anatomic block dissection. Besides these natural factors, our contemporary operative technics are unsuitable for these "poor risk" patients, in that a tremendously time-consuming procedure is necessary to bring an uninvolved structure, the stomach, into the chest to substitute for the resected organ. These technics also carry the potentiality of impeding the normal cardiac sphincteric processes, which leads to regurgitation, esophagitis and ulceration, which, in turn, may predispose to stricture formation at the suture line. The atonic gastric sac in the chest interferes with the physiologic process of respiration and predisposes to pulmonary complications and later postprandial discomfort.

The picture, as represented, shows an old, malnourished, poor risk patient, with a 15 to 40 per cent chance of dying on the operating table or within the immediate postoperative period and, if he survives, of living a life of minimal comfort and of short duration.

This unpleasant prospect necessitates new and more radical deviations from the norm if progress is to be made. Before going on, it is well to mention that, in this modern day of synthetics, surgeons must bow to the scientific fact that certain manufactured products are entirely compatible with the human organism and may be better than the substitution of a natural organ already present.

Along these lines, I have observed for three years, in experimental animals, the replacement of segments of the thoracic portion of the esophagus with a specially prepared polyethylene plastic tube. The experimental work, as has been reported, was extremely encouraging in that the operative procedure was short and simple. The length of the portions of esophagus resected was of little significance, and the tube, which has the diameter of a normal esophagus, may remain permanently or be removed after if has been completely surrounded by an epithelium-lined fibrous sheath, which forms within sixty days. The operative mortality and morbidity rates were almost insignificant.

The first clinical patient was operated on almost two years ago. Up to the time of writing the procedure has been employed in 30 cases, in 28 instances for malignant disease. In 95 per cent of these there was regional extension of the disease at the time of operation. The length of the esophageal segment resected was variable. The longest portion extended almost two-thirds the length of the organ. The time on the operating table was consistently less than two hours, the anastomosis taking approximately fifteen min-

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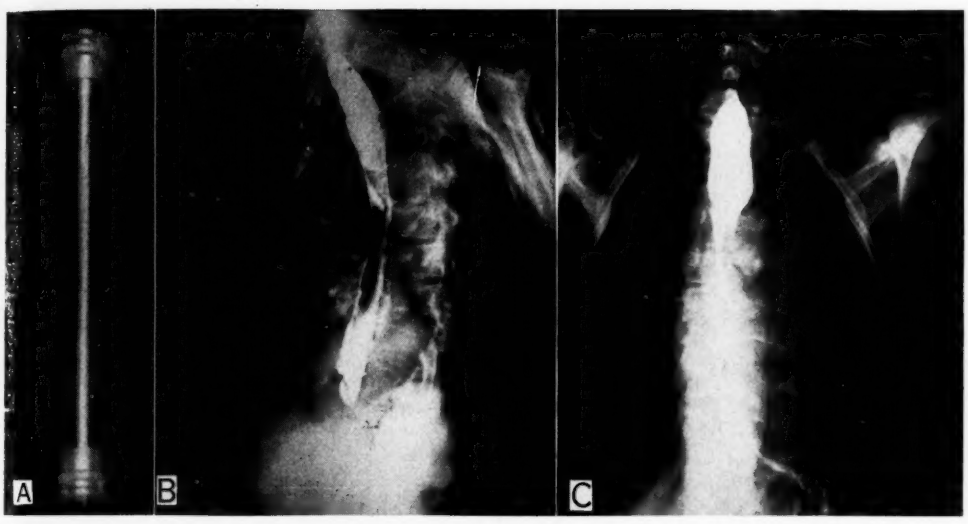
utes. The amount of blood given per operation was approximately 400 to 500 cc., obviating disturbances in hemodynamics that usually occur when longer procedures are carried out on elderly patients. The first patient operated on died thirteen months afterward of metastasis, with no discomfort in eating until his demise. All those who are still living eat normally.

Operative and Postoperative Care.— The patient is carefully evaluated as a possible operative risk. If he is a risk he is deemed operable, for this procedure may be used as either a palliation or an attempt at cure.

The operative procedure is done, at present, solely through the right side of the chest unless the lesion is extremely low, when under which circumstances the left side of the chest may be used. Abdominal and diaphragmatic incisions are unnecessary. The approach is through the fourth to the seventh rib bed on the right, depending on the site of the lesion. The lung is packed off and the mediastinum over the lesion carefully opened. This is an important step, as it is essential to keep the mediastinal pleura intact for later closure. The esophagus, with the lesion, is mobilized. Glands are palpated and resected. The malignant tissue is dissected from the surrounding adjacent structures as cleanly as possible. If there is invasion of surrounding structures and palliation is the only possibility, tumor tissue is left on these vital structures. The esophagus is then cut across proximally, leaving approximately 3 or 4 cm. of normal tissue at either end, and Babcock clamps are placed to grasp the proximal cut edge of the esophagus. This procedure is repeated distally. If very low, the esophageal hiatus may be enlarged with the finger and a small portion of the stomach drawn through for the distal anastomosis. One of the series of six plastic tubes, varying in length from 4 to 9 inches (10.1 to 22.8 cm.), is then approximated for length, making sure that at least 1 cm. of cuff will be covered by the esophageal edge in the complete anastomosis.

The anastomosis is begun proximally. A No. 0 atraumatic braided silk suture on a small curved needle is passed through the entire thickness of the esophageal wall from without inward, about 2 cm. proximal to the edge. This suture is taken through the anterior eye of the tube cuff and then back through the entire thickness of esophageal wall from within outward, about 0.5 cm. from the initial point of penetration. The tube is held by an assistant about 3 inches (7.6 cm.) from the orifice while another assistant holds the orifice of the esophagus open by spreading the Babcock clamps. The same suture is then continued posteriorly through the entire thickness of the esophageal wall at about the same distance from the edge, from without inward. It is next taken through the posterior eye in the cuff of the tube and then through the esophageal wall, again from within outward. The Babcock clamps are spread apart as far as possible without tearing the esophagus, and the tube is screwed gently into the orifice until the entire cuff is covered. The suture is then drawn in a sawing manner until snug. The free end of the tube is pushed gently cephalad, and the Babcock clamps are pulled gently caudad while the anchoring purse string suture is tied tightly. If this is not done in the manner described, it is possible that tying the suture without the support of the tube may express the tube from the orifice, leaving the purse-string constricting the proximal portion of the esophagus. The ends of the suture, after being tied, are then brought around the esophagus again and tied loosely. At this point the suture is cut and, with tension still maintained on the Babcock clamps, another separate suture of the same material is taken around the edge of the esophageal wall in a simple purse-string manner, which makes the anastomosis watertight. This procedure is repeated distally. However, when working with the distal anastomosis, one must not forget that the proximal end is now anchored. When the sutures are placed and the tube in, ready to be screwed into the orifice.



A, type of polyethylene tube now being used. It is made to order in six different lengths, ranging from 4 to 9 inches (10 to 22.5 cm.), with an outer diameter of ¾ inch (1.9 cm.). They are extremely pliable, with semirigid ends to take the anastomosis. *C*, Preoperative roentgenogram showing a large midthoracic lesion. *B*, film taken four weeks after the operation, showing the barium going easily through the proximal portion of the esophagus, through the tube and into the stomach. There is normally some barium outside the tube but incased within the new sheath that forms around the tube. The tube, at this point in convalescence, is loose but snug within the new sheath.

the flexible tube may be bent in the middle to facilitate this. When the tube has been screwed in, the suture is snugly tied.

When the anastomosis is complete, the tube with both the esophageal ends is laid in place. The chest is mechanically washed with saline solution and suctioned out. A Levine tube is then placed through the nose down into the esophagus through the tube and into the stomach and the mediastinal pleura closed tightly over the tube with interrupted silk sutures. When these sutures are placed, a bite through the superficial portion of the esophageal wall, at either end and through the loose suture, is advocated. Thoracic drainage is established through a large catheter one or two interspaces below the incision in the posterior axillary line. The chest is closed in layers.

Both the chest catheters and the Levine tube in the stomach are attached to continuous suction apparatus. The patient is given penicillin and streptomycin, and the usual postoperative care of the chest is administered. The patient's nutrition is maintained intravenously and is adjusted according to the blood chemical data. It is extremely important to watch the chest carefully for possible fluid accumulation in either pleural cavity. Aspirations are carried out when necessary. The chest catheters are usually removed in forty-eight to seventy-two hours. The patient is ambulatory on the third or fourth postoperative day.

Because of the possible gastric atony due to vagal section and to prevent vomiting, the Levine tube is kept on continuous suction for four days. On the fifth postoperative day, liquids are fed through the tube, and on the seventh day the Levine tube is removed and the patient begins to take a full liquid allowance, gradually progressing to a normal diet. The patient is usually discharged on the fourteenth day, taking a postgastric diet. In the last

fifteen cases the postoperative course has been relatively smooth.

REPORT OF CASE (Fig. 2)

W. B., a man aged 65, was admitted to the hospital in April 1952. The chief complaint was difficulty in swallowing for the past two months, during which his condition had grown progressively worse until he could only drink liquids. There was some substernal burning on the passage of solid foods. There was a great loss in weight prior to admission.

The physical history was noncontributory. Physical examination revealed no abnormality except for definite evidence of recent loss in weight. The laboratory data were normal except for slight anemia. Roentgen examination after a barium swallow showed carcinoma of the middle third of the esophagus. Esophagoscopically, 30 cm. below the incisors, a biopsy specimen was taken of a granular mass and showed an immature squamous cell carcinoma of the esophagus.

The patient was prepared for operation by administration of intravenous fluids and transfusions until the blood chemical values were approximately normal.

With the patient under sodium pentathol and endotracheal cyclopropane ether-oxygen anesthesia, an incision was made and the right sixth rib was resected. The pleural cavity was entered, and the esophageal mass was palpated just below the azygos vein. The esophageal mass was attached to both the aorta and the carina and measured approximately 8 cm. in length. The mass was resected and a 7-inch (17.5 cm.) plastic tube was inserted in the manner previously described.

The patient was discharged fifteen days after the operation, taking a postgastric diet. He has since gone home but has been unable to work. At the time of writing, six months after the operation, he is progressively going downhill, with signs of metastasis.

SUMMARY AND CONCLUSIONS

A contrasting analysis of the results in these 28 cases and those in which the usual conventional methods were employed reveals that the mortality rate is considerably decreased, the morbidity negligible and the comfort of the patient tremendously improved by use of the method here presented. To elucidate, time on the operating table and operative trauma are of the essence in the surgical treatment of elderly, malnourished carcinoma patients. In the last 15 cases in which this technic was employed, the operating time was under an hour and a half for even the highest lesions, as contrasted to four or five hours by the older technics, the anastomosis taking approximately ten minutes. The mortality rate has been under 10 per cent, in contrast to 15 to 40 per cent, even in the best hands, with other methods. As to the morbidity, leakage from the mediastinum was observed in 1 patient, which ceased in a short time. Pulmonary complications were practically nonexistent, and there has been no history of regurgitation or other evidence of esophageal irritation in patients followed for over a year since the operation. Longevity is not increased by this procedure except to the extent that a longer portion of esophagus may be resected, and, with the time saved by this method, more would be available for meticulous gland dissection.

The postoperative course, in most cases, has been extremely smooth, with no evidence of mediastinitis. The patients eat full meals comfortably, with none of the usual postprandial dyspnea and fullness. As to palliation, this procedure is certainly more attractive than a gastrostomy.

A method has been devised and a technic developed to replace portions of esophagus with a special plastic tube. A fibrous sheath lined with epithelium forms around the tube, and the tube may be removed by esophagoscopic methods a few months after the operation, with little possibility of stricture. Twenty-eight patients have been treated for carcinoma by this method, with extremely good results. As much as 7 inches (17.5 cm.) of esophagus has been resected and replaced by the tube. The approach is solely through the right side of the chest. The operative time is short, the mortality rate is low, convalescence is smooth, and eating is normal within ten days after the operation, with

none of the thoracic discomfort attendant upon the usual procedure.

RIASSUNTO

E' stato ideato e messo a punto un nuovo metodo per sostituire pirti di esofago con uno speciale tubo di plastica. Attorno ad esso si forma un involucro fibroso, tappezzatta do epitelio, e il tubo può essere estratto, in endoscopia, dopo qualche mese, con scarse probabilità di stenosi.

15 malati sono stati curati così, con risultati eccellenti. Sono stati resecati fino a 17,5 cm. di esofago, e sostituiti col tubo. L'accesso, per solito, è stato quello destro; la durata dell'intervento è breve, la mortalità bassa, la convalescenza liscia, l'alimentazione normale entro 10 giorni, senza alcuno dei disturbi usuali dopo la altre tecniche.

ZUSAMMENFASSUNG

Der Verfasser hat eine Methode erfunden und eine Technik beschrieben, Teile der Speiseroehre durch ein besonderes plastisches Rohr zu ersetzen. Es bildet sich eine fibroese mit Epithel ausgekleidete Huelle um das Rohr, das wenige Monate nach der Operation mit Hilfe des Oesophagoskops entfernt werden kann; die Moeglichkeit einer Strikturbildung ist gering. Fuenfzehn Kranke sind mit aeusserst guenstigem Erfolg auf diese Weise behandelt worden. Die resezierten und durch das Rohr ersetzten Teile der Speiseroehre waren bis zu 17,5 cm lang. Der Zugang erfolgt ausschliesslich von der rechten Seite der Brust. Die Dauer der Operation ist kurz, die Sterblichkeitsquote niedrig, die Rekonvaleszenz leicht, der Speisevorgang innerhalb von zehn Tagen nach der Operation normal, ohne dass Brustbeschwerden auftreten, wie sie mit den sonst ueblichen Verfahren verbunden sind.

RESUMEN

Se ha ideado un método y desarrollado una técnica para restaurar porciones esofágicas con un tubo especial de plástico. Alrededor de éste se forma una capa fibrosa revestida de epitelio, pudiendo retirarse el tubo por métodos esofagoscópicos unos cuantos meses después de la operación, con poca probabilidad de estenosis. Se trataron 15 pacientes con este método, con resultados extremadamente buenos. Aproximadamente 7 pulgadas (17.5 cm.) de esófago se extirparon y substituyeron con tubo. Se interviene solamente por el lado derecho del tórax. El tiempo operatorio es corto, el índice de mortalidad bajo, la convalecencia sin incidentes y la alimentación normal tiene lugar diez días después de la intervención, con ninguna de las molestias torácicas inherentes al procedimiento ordinario.

SUMÁRIO

Um metodo é proposto e uma tecnica descrita para reparação de determinada porção do esofago, às expensas de um tubo plastico especial. Uma bainha fibrosa com um epitelio se desenvolve em torno do tubo plástico, podendo o mesmo sêr retirado alguns mêses apos a intervenção, através esofagoscopia.

Quinze doentes foram tratados por êsse processo, com excelentes resultados. No máximo sete polegadas (17,5 cms.) de esofago foram ressecados e refeitos pelo tubo plástico especial. O acésso cirúrgico é apenas feito atravês o hemitorace direito. O tempo operatório é curto, o indice de mortalidade baixo e o periodo de convalescença é calmo, podendo o operado se alimentar normalmente dez dias após a intervenção. Não existem as perturbações torácicas comuns aos processos usualmente empregados até então.

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Measures for Reducing the Morbidity and Mortality of Abdominal Surgery

W. WAYNE BABCOCK, M.D., F.A.C.S., F.I.C.S.
PHILADELPHIA

DESPITE great advances and marked reduction in morbidity and mortality rates, perfection in abdominal surgery has not been attained. Disability and death too frequently occur from lack of known but unused safety measures. A routine addition to the technic may be well worth adopting if it will save the life or prevent disability of even the four hundredth or the thousandth patient.

Hemostasis.—Exsanguination following an abdominal operation is preventable. A not infrequent cause is a single catgut ligature tied in a square knot on a vein or an artery. The catgut swells and becomes slippery and the knot loosens, or even comes untied if the ends have been cut short. To prevent this, some surgeons leave the ends of the catgut projecting 1 or 2 cm. Others add a third hitch to the knot. A ligature of silk, linen or cotton with its ends cut short is much more dependable but may lead to a chronic sinus if left in a septic field. Although ligatures of stainless wire may be left in a septic field without the development of a sinus, the knots are often insecure owing to kinking. Two well-placed ligatures are to be considered for every large vessel. It is to be remembered that a ligature is more apt to slip off of the end of a thin-walled vein than off that of a thick-walled artery. Equally important, if not more so, is the recognition of a hemorrhage at its inception. This is best accomplished by using a small sump (aspirating) drain during the first twenty-four or forty-eight hours after every abdominal operation from which hemorrhage may occur. The drain shows the onset of bleeding, its amount and its arrest, and is of great advantage in the diagnosis of hepatic anoxia and other conditions with symptoms that simulate those of a concealed hemorrhage. It also limits the infiltration and diffusion of the blood in the abdomen and abdominal wall and offers the best guide as to the amount of blood that may be required for replacement.

Sump or suction drains are made of stainless steel to avoid tissue reactions and the production of adhesions. Such a drain consists of an outer tube with lateral perforations and a closed lower end, and a smaller loose inner aspirating tube attached by a rubber or plastic tube to a collecting bottle, from which the air is continuously evacuated by a small electric suction pump. The drains are made in a variety of lengths and diameters, in order to reach from a surface wound to any part of the abdominal cavity. The diameter of the outer tube, and of its lateral openings, vary as may be required for thin, clear or heavy viscous fluids with more or less precipitate. The collecting bottle should be of ample capacity, so that fluids may not overflow and enter the motor. For the suction pump, a small inexpensive magnetic air pump used for aerating aquariums, which has no piston and requires no lubrication, serves very well when the valves are reversed. As our hospital is not piped with outlets for aspiration, we have over 100 of these outfits on hand. The stainless steel drains may remain for days in the abdomen without producing adhesions. Joined by tubing to a collecting bottle aspirated by the motor-driven air pump, the drain will remove irritating fluids entering the ab-

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dominal cavity so rapidly and effectively that in many cases no abdominal symptoms result. Obviously, for safety the aspiration of abdominal cavity must be continuous until all leakage has ceased.

Biliary Surgery.—The use of continuously acting suction drains has quite revolutionized the results of biliary operations. First, the drains have shown the frequent leakage of considerable quantities of bile from the denuded surface of the liver into the peritoneal cavity after a simple cholecystectomy. Occasionally this may amount to from 500 to 1,500 cc. of bile in the first postoperative twenty-four hours—enough, if not removed, to cause fatal "bile peritonitis." With suction drainage such large amounts of bile are rapidly removed without apparent peritoneal reaction. This has led my associates and me to eliminate the irritating indwelling drainage tubes in the bile ducts after operations on the biliary tract. Such indwelling tubes, particularly if made of rubber, seriously damage the lining of the ducts and lead to a change in the character of the bile, with precipitation of calculi. The pathologic process is also intensified by the entrance of bacteria from outside the body in and along the tube. The irritating effect of rubber may be shown in the experimental animal by leaving a short section of sterile rubber tubing in the animal's closed abdomen. The tube is rapidly encased in peritoneal adhesions, which thicken, and central ulceration develops and may finally perforate into an adjacent intestinal loop. Quite different is the peritoneal reaction to a segment of a sterile tube made of stainless steel, vitallium or glass, any of which may remain in the abdominal cavity for a number of days with relatively little reaction or adhesion formation. Of course, when placed in a bile duct of a living person even a vitallium tube is irritating, but the process is slower than that resulting from rubber and certain other forms of tubing. Eventually, however, ulceration and thickening of the duct occur about the vitallium, and, with the precipitation of sand and stones from the bile, the removal of the foreign bodies from the ducts becomes acutely advisable. Surgeons have not generally appreciated the harmfulness of any foreign body left in a bile duct, or that the need of a second operation upon a duct is often due to the damage from a drainage tube previously worn in the duct. The damage from such indwelling tubes is a reason why patients have had to undergo as many as ten, twenty or more successive operations, each in a measure intended to remedy the damage produced by a previous one. Or, the patient has finally worn an indwelling tube in his bile ducts for a year or more to overcome the injury caused by previously wearing intraductile tubes for shorter periods. With the assurance that it is now possible to remove, safely and rapidly, any bile that may leak into the peritoneum, the surgeon may suture and ligate the bile ducts without the use of indwelling tubes or the fear of secondary bile peritonitis. However, sutures placed in the ducts should not be exposed on the mucous surface of the duct, and the patient's safety will depend upon expert supervision during the early postoperative period. In all cases a continuously acting sump drain is left in the upper part of the abdomen after the operation until all evidence of any intraperitoneal leakage has ceased.

Only in anastomosis of the common duct to the duodenum or the jejunum have I used a tube in the common duct during recent years. Here, to prevent leakage, I have tied a small tube in the end of the duct, which is then brought through small openings made on the medial and lateral sides of the intestines, and then out of the abdominal wound. The bile duct is sutured to an inverted fold of the serous coat of the bowel, proximal to the ligature about the tube. A sump drain is placed adjacent to the anastomosis to protect against early leakage, and the tube drain is withdrawn from the bowel and the duct after a week or ten days.

Postoperative Intra-abdominal leakage of urine or gastrointestinal contents may

be immediately revealed and often effectually evacuated by the routine use of a continuously acting postoperative suction drain. Even with the presence of fecal particles or urine in the drainage after resection of the colon or bladder, if there are no symptoms of peritonitis I have continued the use of the aspirating drain until all drainage has ceased, which not infrequently has been followed by primary union of the abdominal wound and recovery.

Wound dehiscence and hernias are best prevented by the routine exclusive use of interrupted layer of figure-of-8 sutures of stainless steel wire in the abdominal wall. These complications have occurred six times as frequently after the use of catgut than after the use of wire closure (George Rosemond). The wire should be tied in a square knot, not twisted, and the ends cut off very close to the knot, with scissors made of high carbon steel. Tantalum and silver wire sutures are weaker, are subject to fragmentation in the abdominal wall and are not advised. For large defects a very soft and pliable stainless steel mesh (80-mesh 0.003 wire or 120-mesh 0.0026 wire) has been satisfactory. A stiffer mesh buried in the abdominal wall will buckle under flexion, separating the abdominal layers, with troublesome collections of bloody serum that may persist or recur unti the mesh is removed. With deeper layers of the abdominal wall defective, the mesh may be left in direct contact with abdominal organs. In a week or so it will be covered by a new lining resembling peritoneum. Tantalum mesh is weaker, and in the abdominal wall usually yields to fragmentation within a year, occasionally with the extrusion of broken wire—complications I have not observed with mesh made of stainless steel.

Chronic postoperative biliary fistulas and other fistulas not due to an obstruction may often be closed in three or four days by introducing a short section of snugly fitting drainage tube into the fistula. The outer end of the tubing is attached to a continuous-action aspirating device. Under aspiration the walls of the duct collapse and are pressed together, and if there is no internal obstruction the fistula often closes permanently in two to four days.

Persistent hemorrhage from the liver, the spleen or other abdominal surface during operation has been controlled in recent years by applying one of the so-called absorbable gauzes, as oxycel or gelfoam. Unfortunately, in the presence of bile or gastrointestinal contents these hemostatics fail to be absorbed and become very harmful by producing intense inflammation and necrosis of the surface of adjacent organs and peritoneum, which persists until the "gauze" is removed by operation. To avoid such serious reactions the surgeon reverts to the time-honored pressure packing with ordinary sterile gauze. This has two drawbacks: first, the wound must be left partly open for removal of the gauze; second, if the pressure is insufficient, additional packing, usually with the patient anesthetized, is required, and finally, for removal of the gauze and closure of the open part of the wound an anesthetic is necessary. To avoid these complications my associates and I have used a long roll of gauze, 5 cm. wide, folded to about 2 cm. in width. This is packed back and forth over the bleeding surface until the hemorrhage is arrested, and the end is then brought out through the wound in a glass or metal tube 2 cm. in diameter, after which the wound is accurately closed with sutures about the tube. Should the hemorrhage recur it may be arrested in the patient's bed, without anesthesia, by attaching and packing sufficient additional gauze tape through the small tube with an ordinary wire gauze packer. In doing this the tube is directed toward the area requiring the greatest pressure. Days later, the danger period having passed, the gauze is withdrawn, perhaps intermittently, through the tube and usually without anesthesia or disturbance of the closed wound. The small opening in the wound left by the final removal of the tube may not require a suture.

Jaundice from carcinoma of the liver, with its intense pruritis, may be relieved

by a simple external hepatostomy. Through a transverse or oblique incision the liver is sufficiently liberated so that it can be anchored in the incision with its edge protruding 2 or 3 cm. With the wound closed, a wedge-shaped portion of the exposed liver is resected to a depth of 2 to 5 cm. Hemorrhage is arrested by temporary gauze packing. While the bile escapes externally, patients accept the drainage of bile upon the abdominal wall for the great relief obtained from the intense pruritis.

Vaginal cul de sac operations.—An opening made through the vaginal cul de sac and then enlarged by the fingers is a quick and relatively safe approach for exploration and evacuation of the female pelvis. Not only may the diagnosis of a tubal pregnancy be made, but the tube and ovary may be removed with ligation of the pedicle through the vaginal incision, or, if preferred, the pedicle may be clamped, and the tube and ovary removed, while the clamp is not taken off until the end of twenty-four or forty-eight hours. The operation requires but five or ten minutes time and causes little operative shock. Gauze drains are left in the cul de sac for six to eight days to complete the evacuation of abdominal blood and serum. This approach is also the safest method for the evacuation and drainage of purulent and inflammatory collections in the pelvis.

SUMMARY

The importance of good drainage and adequate hemostasis to the effectiveness of abdominal surgical procedures is emphasized. Postoperative intra-abdominal leakage, wound dehiscence, hernia, fistula, persistent hemorrhage and jaundice, with their appropriate treatment, are discussed. A procedure for exploration and evacuation of the female pelvis through an opening made in the vaginal cul-de-sac is described.

In the author's opinion, disability and death too frequently occur during or after abdominal operations because of insufficient use of safety measures readily available.

RESUMEN

Se señala la importancia de la buena canalización y la adecuada hemostasia para que sean efectivos los procedimientos quirúrgicos abdominales. Se discuten con sus tratamientos apropiados derrame intrabdominal postoperatorio, dehiscencia de la herida, hernia, fístula, hemorragia persistente e ictericia. Se describe un procedimiento para exploración y evacuación de la pelvis femenina por una aberutra en el fondo de saco vaginal.

El autor opina que incapacidad y muerte ocurren demasiado frecuentemente después de operaciones abdominales, por falta de medidas de seguridad desde luego utilizables.

SUMÁRIO

E realçada pelo autôr a importancia de uma bôa drenagem e de uma hemostase cuidadosa para a maior eficacia dos procéssos cirúrgicos abdominais. Os derrames intra-abdominais posoperatórios, a deisicencia da parêde, as hernias fistulas, hemorragias persistentes e a ictericia foram estudadas, inclusive sob o aspeto de um tratamento adequado. Foi ainda descrito nêsse trabalho um processo para exploração e evaluação da pelvis feminina através uma incisão no fundo de sáco vaginal. Na opinião do autôr o insucesso e a morte ocorrem com mais frequencia durante ou após intervenções abdominais, pela falta de aplicação exata de meios salvadôres de valôr inconteste.

ZUSAMMENFASSUNG

Die Bedeutung guter Drainierung und ausreichender Blutstillung fuer den erfolgreichen Ausgang chirurgischer Eingriffe am Bauch wird betont. Nach der Operation auftretende Undichtigkeiten innerhalb des Bauches, Nahtinsuffizienzen, Brueche, Fisteln, anhaltende Blutungen und Gelbsucht und die Behandlung dieser

Zustaende werden eroertert. Es wird ein Verfahren zur Explorierung und Entleerung des weiblichen Beckens durch eine im cul-de-sac der Scheide angelegte Oeffnung beschrieben.

Invaliditaet und Tod t r e t e n n a c h Ansicht des Verfassers allzu haeufig waehrend oder im Anschluss an Bauchoperationen auf, weil leicht ausfuehrbare Sicherheitsmassnahmen nicht in genuegendem Masse angewandt werden.

RIASSUNTO

Viene sottolineata l'importanza di un drenaggio efficace, e vengono discussi i vantaggi di un'accurata emostasi nella chirurgia addominale. Vengono trattati i cedimenti intra-addominali post-operatori, le deiscenze di ferita, le ernie, le fistole, le emorragie persistenti e l'ittero, e i relativi metodi di cura. Viene descritta una tecnica per l'esplorazione e il drenaggio del piccolo bacino nella donna attraverso i fornici vaginali.

L'autore è d'avviso che troppe infermità e decessi sono dovuti all'insufficiente impiego delle misure di sicurezza facilmente disponibili nella chirugia addominale.

RÉSUMÉ

L'auteur insiste sur le drainage adéquat et l'hémostase parfaite dans la chirurgie abdominale. L'auteur disserte sur le suintement post-opératoire intra-abdominal, la déhiscence de la plaie, l'hernie, la fistule, l'hémorragie tenace et la jaunisse; il en donne leur traitement. L'auteur décrit un procédé d'exploration et d'évacuation du bassin chez la femme par une ouverture pratiquée dans le cul de sac. L'auteur est convaincu que les complications et la mortalité post-opératoires trop fréquentes sont dues à un manque de précautions.

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Treatment of Stones in the Common Bile Duct

N. FREDERICK HICKEN, M.D., F.A.C.S., F.I.C.S., AND
A. J. McALLISTER, M.D., F.I.C.S.
SALT LAKE CITY, UTAH

OUR interest in the treatment of stones in the common bile duct does not originate from our successes; rather it has taken impetus from our failures. A personal experience with more than 1,600 operations for diseases of the biliary tract has compelled us to accept and acknowledge our disappointments. All too often we have been chagrined by our failure to open the choledochus when it contained stones. Likewise, we have been embarrassed by our failure to remove all of the elusive intraductal calculi even after the common duct was opened. Why were these errors committed? In order to find an answer to this tantalizing problem, we made an intensive survey of eleven hospitals in our area, comprising the work of 26 different surgeons, and encountered 110 instances in which the operating surgeon had failed to remove all of the offending calculi at the primary biliary operation. Apparently the same mistake which plagued us also troubled other surgeons.

Every surgeon who removes a gallbladder must be prepared by training and experience to determine the functional status of the larger bile ducts. It must be remembered that disease processes are not confined to the gallbladder but invariably involve the contiguous ducts. Their close anatomic proximity, their common lymphatic drainage, and the constant exchange of bile and other secretions between the two systems provide sufficient mechanisms for the spread and dissemination of a pathologic process. Even the surgeon whose operations of this type are only occasional can recite the indications for exploring the common bile duct, but many of them experience considerable difficulty in translating this didactic information to conditions encountered at the operating table. They are not familiar with the shortcomings and limitations of these indications.

Indications for Opening the Common Bile Duct.—Presence of a Palpable Stone: Palpatory detection of an intraductal stone is a prime indication for choledochotomy. Unfortunately, not all calculi can be identified by this means. If the stones are small, if they are embedded in the ampullary segment, or if they reside within the liver ducts, palpatory detection is impossible. When one appreciates that the bile ducts are surrounded by adipose tissue, lymphatic tissue, and blood vessels, covered by the duodenum, and often encircled by a protective collar of succulent pancreatic tissues, it is easy to understand why many stones cannot be palpated. Many times intraductal stones have been located by means of operative cholangiographic study, and yet their presence could not be confirmed by palpation. I have implanted small stones within the common duct and then had my residents try to locate them by the touch system; it has been a very effective means of teaching them the inadequacies of palpatory detection. In all of the 110 cases of "overlooked" stones we have studied, the stones were missed because of the ineffectiveness of digital examination.

Twenty-seven per cent of all intraductal calculi removed by myself and my associates were not discovered by the examining fingers. If palpation were relied on for the detection of these elusive calculi, such stones could and would most certainly be missed. During the past three years we have operated on 26 women

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under 30 years of age, and 42 per cent of them have had intraductal stones, none of which were discovered by the examining hand. Yes: a palpable stone is an indication for ductal exploration, but negative results afford no assurance that the ducts are normal.

Dilatation of the Large Bile Ducts: Everyone agrees that all dilated bile ducts should be explored. It is postulated that the obstruction to the flow of bile produces sufficient back pressure to cause hydrohepatosis. The only fallacy connected with this premise is that larger bile ducts conform to no standard pattern for size. Can we expect biological variations in size? One man wears a No. 6 shoe and another man requires a No. 15, yet by anatomic and functional standards both men have normal feet. Similar variations in size can be applied to the choledochus. We have made actual micromatic measurements, both at operation and at autopsy, of 225 men and women without diseases of the biliary system. In 22 per cent of the cases the common bile duct had a diameter of 4 mm. or less, in 52 per cent this measurement averaged 5 mm., and in 26 per cent it varied from 7.5 to 10 mm. It is apparent that at least 48 per cent of these persons had common bile ducts smaller or larger than those described in textbooks on anatomy.

Size affords a poor index as to the need for ductal exploration. Many dilated ducts contain no stones, and many small or even normal-sized ducts contain small calculi, biliary sand, and cellular detritus. If one waits for dilatation to occur, only the bile ducts of patients suffering from an obstructive calculus will be explored. At least 75 per cent of our patients with choledochal stones failed to exhibit ductal dilatation.

Jaundice: The presence or the history of jaundice was long considered the one clinical sign that made exploration of the bile ducts mandatory. This dictum was developed years ago, when only patients with well advanced biliary disease were placed on the operating table. Today the picture has completely changed, for fully 75 per cent of all jaundice is not remediable by surgical therapy. Virus hepatitis, toxic hepatitis, chemical hepatitis, primary and metastatic malignant tumors of the liver, cirrhosis, and many other chronic conditions produce clinical jaundice which is not benefited by ductal explorations. If the surgeon uses jaundice as the sole guide for choledectomy, many useless operations will be performed.

On the other hand, not all intraductal stones produce jaundice. The bile ducts have a tremendous adaptive capacity, and stones measuring as much as 3 cm. in diameter often fail to produce cholemia. We have found that only 20 per cent of our patients with intraductal stones had a history of cholemia. This means that more than 80 per cent of the calculi would have been overlooked had the increased bilirubinemia been used as the criterion for ductal operations. This is partly explained by the fact that surgeons today recognize dysfunctions of the biliary tract much earlier than did their forefathers, and the stones are removed before they have an opportunity to cause jaundice.

Pancreatic Enlargement: Pancreatic enlargement usually produces an encroachment on the ampullary portion of the common bile duct, resulting in biliary stasis. Dragstedt reported that more than 60 per cent of all pancreatitis is associated with dysfunctions of the biliary tract. It is obligatory that the surgeon determine whether an intraductal stone, an ampullary carcinoma, or a primary neoplasm of the pancreas is responsible for the impending cholemia. We wish to emphasize the inadequacy of palpation in determining the presence of ampullary calculi. During the past two years we have operated in 15 cases of chronic recurring pancreatitis, only to find small calculi incarcerated within the ampulla of Vater, and hence responsible for the obstructive syndrome. These patients had all been operated on previously, and their condition had been diagnosed as "idiopathic recurring pancreatitis."

Small Gallstones: Experience dictates that if the gallbladder is filled with stones

the size of BB shot, some of them may have been carried into the larger bile ducts. These tiny calculi cannot be detected by palpation; they are too small to effect any dilatation of the bile duct, and they do not interfere with the free flow of bile—hence there is no jaundice. But in spite of the absence of all these clinical signs, we are convinced that the common duct should be explored. This is true particularly when one is dealing with young women.

Small, Contracted, Stoneless Gallbladder: Lahey pointed out that, if the gallbladder is small, contracted and fibrosed but contains no stones, the primary cause of the inflammatory process often resides in the common bile duct in the form of a small stone. In such cases exploration is indicated.

COMMENT

Every surgeon who elects to remove a gallbladder must be able to determine the functional status of the larger bile ducts. Do they harbor offending calculi? It is true that this question could be answered by performing routine ductal explorations in all patients submitting to a cholecystectomy, but this would lead to many unnecessary operations. It is just as serious a mistake to explore the bile ducts needlessly as to fail to remove an elusive intraductal stone.

Errors, both of omision and of commission, can be greatly minimized by cholangiographic studies at the operating table. We routinely explore every bile duct, but this is done by visualizing roentgenograms rather than by rough instrumentation. Only those bile ducts which harbor stones are explored; the others are not molested.

Operative cholangiographic study is a simple procedure that yields considerable information and can be done without danger to the patient. A Bucky-Potter diaphragm is placed on the operating table so as to include the upper portion of the abdomen. After the abdomen is opened, a suitable contrast substance, such as diodrast, is injected into the biliary system, after which a roentgenogram is taken. This provides an actual roentgenographic pattern of the bile ducts. It denotes the size, shape and position of the bile ducts; it depicts any anatomic abnormalities; it outlines the size, position and number of offending calculi, and it provides a blueprint of the problem confronting the surgeon. Since 1936 we have employed this method as a routine procedure in all operations on the biliary tract and have found it most helpful. Not only does it prevent many unnecessary ductal operations, but it has detected the presence of many stones that we could not locate by other conventional methods.

Scout Cholangiograms.—Scout cholangiograms afford an excellent means of obtaining a composite pattern of the entire biliary system. If the diodrast is injected into the gall bladder, and if the ducts are patent, a normal picture results. If the ducts are not dilated, if they do not contain stones, and if the ampullary orifice is patent, there is no need for ductal exploration.

Choledochograms.—Choledochograms, or roentgen patterns of the common bile duct, can be obtained by introducing diodrast either into the cystic duct or directly into the common bile duct itself. If the resulting cholangiogram outlines a patent, nondistended duct, no further surgical treatment is indicated. If, however, an offending stone is visualized, it should be removed. We have found cholangiograms most helpful.

POINTS ON EXPLORING THE LARGER BILE DUCTS

Localization of Stones.—Remember that a calculi may be found in any portion of the biliary tract. The common bile duct measures from 7.5 to 10 cm. in length, the cystic ducts 4 cm., the common hepatic duct 4 cm., and the right and left hepatic ducts each about 5 cm., which makes a total ductal length of more than 28 cm. in which stones may be harbored. These calculi must be found before they can be removed; this we accomplish by operative cholangiograms. A urologist never

attempts to remove urinary calculi until he has definitely localized them by urographic studies. Fortunately, other surgeons can now employ the same precise methods and hence increase the accuracy and effectiveness of biliary operations.

It has been interesting to chart the position of intraductal calculi. Fully 60 per cent were observed in the retroduodenal and ampullar portions of the choledochus; 10 per cent were confined to the supraduodenal segment; 10 percent to the common hepatic ducts, and 5 per cent to the intrahepatic ducts. In 15 per cent the small stones floated up and down the ducts so that no definite habitat could be assigned them.

Where to Open the Ducts.—Fully 80 per cent of all intraductal calculi can be removed through a vertical incision placed in the anterior wall of the supraduodenal segment of the common bile duct. Intrahepatic stones are more accessible through an incision in the upper end of the common hepatic duct. When stones are impacted in the retroduodenal portion of the common bile duct it may be necessary to mobilize the duodenum after the method of Kocher or to approach the stone by the transduodenal route. These methods should be employed only as a last resort and should never be attempted by the "occasional" surgeon. We have had to perform corrective operations in 5 cases of choledochoduodenal fistula resulting from these accidents.

In our opinion, the stump of the cystic duct does not furnish a large enough aperture for adequate exploration of the common bile duct, and it is next to impossible to investigate the hepatic radicles through such exposures. If the larger ducts require opening, they should be explored through planned incisions.

How to Open the Larger Bile Ducts.—Before any of the larger bile ducts are opened they should be thoroughly exposed. This can be accomplished by reflecting the anterior leaf of the hepatoduodenal ligament, so that the cystic duct, the cystic artery, the common hepatic duct and the choledochus are clearly visualized. This prevents injury to the portal vein or the right hepatic artery, or damage to any aberrant vessels that might be crossing the choledochus. Unexpected hemorrhages usually arise from a field of inadequate exposure.

After exposure of what is thought to be the common bile duct, a small aspirating needle is inserted into its lumen for positive identification. (It is most disheartening to open the portal vein, which sometimes overlaps the common bile duct.) Two small silk sutures are then passed through the anterior wall of the bile duct and, with traction exerted, the wall is incised. We use a small fish-hook type of blade, as this permits cutting the duct with a withdrawing motion, so that the posterior wall will not be incised. It is not uncommon to find that the point of the knife has passed completely through the duct unless such precautions are taken. These traction sutures then evert the lips of the ductal incision, so that rapid exploration can be carried out.

Instrumental exploration of the ducts is accomplished by the gentle manipulation of scoops, probes and stone forceps. Any sign of intraductal bleeding signifies trauma, laceration and stripping of the endoductal mucosa.

We consider it imperative for the surgeon to have some conception of the direction and position of the bile ducts before instrumentation is begun. The bile ducts do not always occupy the same anatomic position. Some are vertical and pass down the right margin of the vertebral column; others are curved and form a large semicircle; some form acute right angles; others make a Z-shaped pattern; some lie in a transverse plan, and others occupy the left lower pelvic cavity. Unless the surgeon is cognizant of these anatomic aberrations, it would seem that ductal explorations are useless.

After a thorough instrumental examination of the entire ductal system, a careful flushing lavage is done. Cellular detritus, biliary sand, fragmented stones and small calculi are often dislodged and flushed into the wound. This seems to

be the only available method for recovery of stones situated within the right and left hepatic ducts—and 10 per cent of ductal stones are found in these positions.

Errors in Ductal Exploration.—We should be remiss were we not to emphasize some of the common errors associated with ductal explorations.

1. Perhaps the most flagrant error is the use of improper instruments. Most bile ducts have a diameter of less than 10 mm.; hence, all instruments must be small, perfectly balanced, and of such angulation that selected instruments can be used for the various ducts. Probes and scoops should be made of pliable material, so that they can be moulded to conform to the contour of the ducts. Stone forceps should be of several sizes and angles, so that force will not be required in their use. Most hospitals have but one set of instruments, usually much too large, and these must be used in every case.

2. Force or undue pressure should never be used in attempting to pass an instrument along the ducts. Strictures, diverticuli, impacted stones, and neoplasms may divert the head of the exploring probe in such a direction that continued force will compel it to penetrate or perforate the choledochal wall. Localized retroduodenal abscesses, cholemic peritonitis and stricture formation invariably follow the rough use of instruments.

When confronted with an obstinate obstruction, we always open the duct at this point. The inserted probe acts as a competent guide to the obstructed area, and an incision is made at this point. Visual exploration is useful in identifying impacted stones, strictures or neoplasms.

3. Failure to pass the exploring probes through the ampullary orifice into the duodenum is a common mistake. Unless the surgeon knows exactly where the ampullary orifice is, he dare not use undue pressure. Because the ampullary orifice often lies at the lower edge of the fourth lumbar vertebra, the surgeon does not explore this segment, for he visualizes the common duct as a short tube. We are never satisfied with probing the duct until we can see the tip of the probe as it impinges against the anterior duodenal wall. Patency can be confirmed by observing the perfusing solutions flow from the choledochus into the duodenum.

4. We wish to condemn the practice of digitally exploring the common duct. Often we have seen the surgeon force the tip of his index finger into the common duct. This lacerates, shreds and destroys the layers of the duct, so that only small remnants of the posterior ductal wall are left intact. Instrumentation is much safer than such digital examinations.

Drainage of the Bile Ducts.—Many of our failures and much of the morbidity associated with choledocholithomies can be attributed to the haphazard methods employed in draining the bile ducts. There is an urgent need to reevaluate some present concepts on this subject. A careful roentgen study, by contrast cholangiographic technics, of 350 patients with T-tubes in their common bile ducts has definitely aroused our interest in this subject. We should like to submit a few impressions for your consideration.

Should the Ducts Be Drained?—Periodically the literature contains arguments in favor of primary closure of the bile ducts after choledocholithotomies. Experience has shown that in many cases the ducts will close by primary union without any untoward effects, particularly if the ampullary orifice is of sufficient size and patency to permit the bile to escape into the duodenum. Proponents of this theory of primary closure maintain that removal of the gallbladder, because of its reciprocal innervation with the sphincteric mechanism, results in an atonic relaxation of the sphincter of Oddi. Removal of the normal tonus of the sphincteric outlet leaves the ampulla gaping and permits constant evacuation of bile.

Does the Sphincter of Oddi Become Atonic After Removal of the Gallbladder?—After making a comparative study of 55 patients before and after the removal of their gallbladders, we have concluded:

1. Removing the gallbladder does not result in an atonic relaxation of the

sphincter of Oddi. The intraductal pressures were the same before the gallbladders were removed as they were after cholecystectomy.

2. Fluoroscopic observations of the sphincter of Oddi after the injection of diodrast into the bile ducts via the drainage tubes indicates that the sphincter exhibits the same rhythmic cycle of contraction and relaxation as was observed prior to the cholecystectomy.

3. The tonus and contractile power of the sphincter of Oddi is greatly enhanced by spasmogenic drugs, such as morphine, codeine, etc. Identical values were obtained in tests of the same patients before and after removal of the gallbladder.

4. Spasmolytic drugs, such as nitrites, aminophylline, etc., always reduce the intraductal pressures in a cholecystectomized subject by further relaxing the sphincter of Oddi. Thus we have radiographic, mannometric and pharmacophysiologic evidence that the sphincter of Oddi maintains its normal neurophysiologic response after cholecystectomy.

If such a premise is correct, and we are convinced that it is, the instrumental trauma and irritation subsequent to choledochotomy might produce increased tonus of the sphincteric outlet. Such spasms interfere with the egress of bile into the duodenum and therefore can conceivably cause extravasation of bile into the operative area. Because of these facts, we employ drainage in all cases in which the larger bile ducts have been opened.

Drainage Tubes.—Any drainage tube, whether made of metal, plastic material or rubber, acts as a foreign body and provokes fibroplastic responses within the walls of the duct. Experience indicates that the urethra, rectum, nasal passages and esophagus, all lined with mucous membrane, do not tolerate an indwelling tube. Why should one expect the bile ducts to behave differently? If one has been compelled to remove a rubber catheter or a vitallium tube from a bile duct after it has been *in situ* for several months, one is sure to be greatly surprised by the intense inflammatory reaction of the contiguous ductal walls. Let us accept the idea that the catheters, T-tubes, etc., all irritate the ductal mucosa. The problem, then, is to reduce this irritation to a minimum.

Catheters and T-Tubes: Catheters or T-tubes should be of soft, pliable, nonirritating material, so that they can readily conform to the shape of the duct. Rigid tubes often produce local necrosis, and we have seen the sharp end of a hard rubber tube erode through the posterior wall of the choledochus.

Size of Tube: It is our opinion that the T-tube should have a diameter equal to two-thirds that of the common duct. This affords an ample safety valve for the escape of bile in the event that the ampullary outlet becomes occluded, and a smaller tube permits a more exact closure of the ductal incision. It is common practice to insert the largest tube the ducts will accommodate and then attempt to pull the ductal walls snugly around the large tube. Such procedures place the tissues on such tension that ischemia results, the sutures pull out, and this contributes to further laceration and trauma of the duct-wall.

Even when confronted by total occlusion of a bile duct we have found that a small catheter provides adequate drainage. It is well to remember that many of the bile ducts are dilated at the time of operation; if large catheters are used, the ducts are prevented from regaining their normal tone during the period of decompression.

Type of Tube: We prefer to employ plastic tubes or, if rubber must be used, the soft latex tubes. The T-tube not only provides an outlet for the bile but funnels the hepatic secretions into the lower portion of the choledochus so that they can pass on into the duodenum. A catheter aspirates the bile, denying the patient these essential metabolic secretions. During the period of drainage we have made repeated cholangiographic studies and have invariably found that the sphinc-

teric outlet admits bile so that external drainage is seldom complete.

There seem to be few if any indications for the use of the long-limbed T-tube, The longer the tube, the greater the irritation. The long tube is difficult to remove, and on two occasions we have had to reopen ducts to effect extraction. In the use of a T-tube the posterior surface of the tube is notched to assist in its removal, and the upper and lower limbs are beveled so that withdrawal is easy. The upper limb of the tube is very short—merely long enough to pass beyond the upper margin of the incision. Remember that the common hepatic duct is but 4 cm. in length, and if long tubes are used the upper limb will enter either the right or the left hepatic duct, thus obstructing the one which is not intubated. Jaundice may occur as a result of injudicious placement of such tubes.

Closure of the Common Duct.—It is well not to use too much suture material in closing the duct around the tube. The T-tube should be pushed so that it rests against the upper end of the incision, after which two or three sutures of No. 0000 chromic catgut should be inserted, in such a way that the free margins of the incision are brought together without undue tension. Neither cotton or silk should ever be used; a suture of either of these materials may migrate into the ducts and act as a nidus for a new stone formation. We have encountered 3 such cases.

It seems futile to attempt to make the closure watertight. If the ductal wall is closed and if the free margins of the hepatoduodenal ligament are brought up snugly around the tube, the closure may appear to be watertight, but simple irrigation of the T-tube will convince the surgeon of the fallacy of this concept. Bile always extravasates around the tube and will follow the catheter to the surface. If the closure is too tight, some difficulty may be encountered in removing the tube. Ducts have been avulsed by undue traction, particularly when nonabsorbable sutures have ben used.

How Long Shall the Ducts Be Drained?—Drainage tubes should be left in place until the postoperative cholangiograms reveal the ampullary outlet to be open so that the bile has free access to the duodenum. As a rule we remove the T-tube within six to eight days after the operation, unless there is an ampullary stricture or overlooked calculi are seen in the ducts. Even in cases of severe jaundice, acute cholecystitis and inflammatory pancreatitis we have not hesitated to remove the tubes within seven to ten days. If the operation has been effective, the duct will drain through the normal channels. Prolonged bile drainage is useless, unnecessary and productive of damage. It seems much better, when confronted with a difficult obstructive problem, to resort to reconstructive operation to relieve the biliary stasis, rather than to employ expectant drainage. During the past ten years we have never maintained drainage of the bile ducts longer than three weeks, and our experience includes every conceivable type of duct problem.

Residual Stones.—The postoperative course affords no indications as to the completeness of the ductal operation. Indigestion, pain, jaundice and persistent fistulas may all be absent and yet the large bile ducts may still harbor stones. This agrees with autopsy data on patients who had choledocholithasis and had never shown any signs or symptoms suggesting this hidden biliary disease. It must be remembered that most patients carry their intraductal stones for months or years before they suffer sufficient discomfort to warrant surgical exploration.

In our study of 110 cases of "overlooked" intraductal stones, only 13 per cent of the patients had sufficient difficulties to necessitate reoperation within two weeks after the gallbladder had been removed. Jaundice developed in only 22 per cent, even though some of them were followed for more than five years; and 20 per cent were completely free from distress, so that they refused further treatment. The only method of determining the completeness of an intraductal operation is to employ postoperative cholangio-

grams, and if this method is used one will be surprised by the large number of failures.

Pribram suggested that "overlooked" stones might be dissolved by injecting ether into the bile ducts. We have employed this method of chemical dissolution in 15 cases, and in only 1 instance were we able to flush the fragmented stones into the duodenum. As a rule the constitutional reactions were so severe that the patients refused to submit to repetitive studies. We have cholangiographic evidence that the instillation of ether into the bile ducts provokes ductal irritation, produces spasms of the sphincter of Oddi and induces edema of the pancreas. In our opinion, chemical dissolution of stones is dangerous.

Whenever possible, one should postpone the secondary operation for several weeks. This permits the patient to recover from the insults of the primary operation; the periductal inflammation and edema markedly subside, so that the surgical procedures can be carried out much more easily at a later date. Seldom will jaundice, pain or persistent vomiting compel immediate exploration after the primary procedure. Unless complications arise, we postpone all such procedures for six to eight months after the first operation.

SUMMARY

The problems presented by stones within the bile ducts require keen diagnostic acumen, sound surgical judgment and excellent technical skill. Any surgeon who desires to remove a gallbladder should be prepared by training and experience to handle complicated intraductal problems. The trend of modern surgery is to put patients with disease of the biliary tract into the hands of experienced men; and by so doing better results can and will be obtained.

RÉSUMÉ

Le problème suscité par des calculs dans les canaux biliaires demande une acuité dans le sens du diagnostic et une adresse chirirgucale très grande. Tout chirurgien qui s'apprête à pratiquer une cholécystectomie doit être en mesure d'enlever aussi des calculs dans les canaux biliaires. On a aujourd'hui tendance à confier des patients avec des calculs dans les canaux biliaires à des chirurgiens expérimentés dans ce genre de chirurgie.

RESUMEN

Los problemas que presentan los colelitos en las vías biliares requieren finura en el diagnóstico, claridad en el criterio quirúrgico y excelencia en la habilidad técnica. El cirujano que desee efectuar una colecistectomía debe estar adiestrado y tener experiencia para el manejo de los complicados problemas intracanaliculares. La tendencia de la cirugía moderna es poner a los pacientes enfermos de las vías biliares en manos expertas y obtener así los mejores resultados.

SUMÁRIO

Os problêmas apresentados pelose cálculos biliares localizados nos canais requerem um aguçado diagnostico, uma segura indicação operatória seguida por uma excelente conduta técnica.

Todo cirurgião que pretenda praticar uma colecistectomia, deverá estar preparado com treino e experiencia para resolver os intricados problemas intracanaliculares.

A norma da cirurgia moderna é colocar os doentes com afecções cirúrgicas das vias biliares em mãos experimentadas, pois, somente dessa forma, melhores resultados poderão sêr obtidos.

RIASSUNTO

I problemi connessi con la calcolosi biliare richiedono settile acume diagnostico, solido giudizio chirurgico, eccellente abilità tecnica. Il chirurgo che si appresti a togliere una colecisti deve essere preparato ed esperto per affrontare i com-

plessi problemi intraduttali. La tendenza della chirurgia moderna è di affidare i malati delle vie biliari a uomini ricchi di esperienza così da ottenere (e si ottengono) i migliori risultati.

ZUSAMMENFASSUNG

Steinbildungen in den Galiengaengen stellen den Arzt vor Probleme, deren Loesung diagnostischen Scharfsinn, chirurgische Urteilsfaehigkeit und technische Geschicklichkeit erfordert. Der Chirurg, der eine Entfernung der Gallenblase auszufuehren beabsichtigt, muss durch seine Ausbildung und persoenliche Erfahrung in der Lage sein, komplizierte Situationen in Faellen von Gallengangsproblemen zu beherrschen. Die moderne Chirurgie ist bestrebt, Patienten mit Gallengangserkrankungen Aerzten mit Erfahrungen auf diesem Gebiet anzuvertrauen und auf diese Weise bessere Ergebnisse zu erzielen.

AVISO A TODOS OS MEMBROS DO COLEGIO INTERNACIONAL DE CIRURGIOES

A Casa dos Delegados, em 19 de maio de 1952, em Madrid (Espanha), escolheu a cidade de Sao Paulo (Brasil) para séde do futuro IX Congresso Internacional do Colegio Internacional de Cirurgioes, aprovando proposta de S. Exia. o Snr. Governador do Estado, Prof. Dr. Lucas Nogueira Garcez, e designou como Comissao organizadora daquele Congresso os membros brasileiros do "Board of Trustees," sob a presidencia do Prof. Dr. Carlos Gama, que é o primeiro Vice-Presidente Internacional, e Secretário Geral para a América do Sul.

O IX Congresso do Colegio Internacional de Cirurgioes terá lugar em Sao Paulo (Brasil), de 26 de abril a 2 de maio de 1954.

Os temas oficiais escolhidos sao os seguintes: 1) Experiancia com a Socializacao da Medicina em vários países.

2) Novas aquisicoes da Radiologia com contrastes, em todas as especialidades cirurgicas.

3) Experiancia com o emprego de antibióticos em todos os ramos da cirurgia.

A Comissao organizadora do Congresso procura desde já todos os elementos para que o IX Congresso do C.I.C. seja um dos mais notáveis do Colégio Internacional de Cirurgioes, ao mesmo tempo que uma das mais brilhantes comemoracoes do IV Centenário de Sao Paulo.

Afim de ter com bastante antecedencia dados seguros sobre o numero dos congressistas, e poder satisfatoriamente alojá-los, e programar de maneira absolutamente funcional as sessos, pede a todos os interessados, queiram comunicar imediatemente à Secretaria, no endereco abaixo.

—Prof. Dr. Carlos Gama, Sao Paulo,
Secretaria, Praca Ramos de Azevedo, 209, 7.° Andar, Sala 710, Sao Paulo, Brasil.

Portal Hypertension

PHILIP THOREK, M.D., F.A.C.S., F.I.C.S.
CHICAGO

RECENT advances in the surgical and medical treatments for portal hypertension have provided a new lease on life for many of the patients suffering with this condition, who only a decade ago were considered incurable. Today such fatal complications as massive hematemesis associated with esophageal varices, melena and ascites can be controlled by direct surgical attack. Whipple, Blakemore and Lord have demonstrated the feasibility of shunting the portal flow directly into the systemic venous circulation by either a portacaval or a splenorenal anastomosis, thus reducing the blood flow through the collateral venous channels in the esophagus and at the same time lowering the portal venous pressure.

Portal hypertension may be due to an intrahepatic or an extrahepatic block. The *intrahepatic* portal bed block is the most common, and is usually the result of hepatic cirrhosis. The flow of blood to the liver is obstructed secondary to the scar tissue replacement of the liver parenchyma. Since it is probably not completely occluded, all the portal flow is not forced through the collateral channels; however, a very large portion of it may be shunted. In this type of block a considerable volume of the hepatic artery blood flow is blocked from entering the hepatic veins and is shunted back into the portal vein, thus increasing the blood flow through the collateral channels.

The *extrahepatic* portal bed block is caused by an occlusion of the portal vein or its main tributaries by fibrous or scar tissue, which may be congenital or acquired. The former probably occurs from the extension into the portal system of the obliterative process that occurs after birth in the umbilical vein and the ductus venosus, thus causing the esophageal varices and splenomegaly as seen in young children. The acquired form occurs as a result of venous thrombosis of the portal vein, phlebitis, fibrous stenosis or cavernomatous transformation of the portal vein.

Three main sites of communication between the portal and the caval circulations are found in cases of portal hypertension. They are the following: 1. At the point of transition between absorbing and protective epithelium, such as is found between the coronary vein of the stomach and the azygos and the diaphragmatic veins, and also between the superior, middle and the inferior hemorrhoidal veins. This communication is of the greatest importance, since it is the one concerned with esophageal varices. 2. At the site of embryologic circulation, namely, the falciform ligament which contains the paraumbilical veins. 3. Within the abdomen where the gastrointestinal tract with its appendages and glands becomes retroperitoneal developmentally or adherent to the abdominal wall pathologically.

Esophageal Varices.—Esophageal varices are usually associated with varying degrees of portal or splenic vein obstruction. The increased portal vein pressure forces the blood into the esophageal veins which lie in the submucosa of the lower part of the esophagus and are poorly supported by loose connective tissue. With the increased quantity of blood, varices develop which become superficial to the esophageal mucosa and may rupture easily. At one time it was thought that Banti's disease was a primary con-

From the Departments of Surgery, University of Illinois, Cook County Graduate School of Medicine, Cook County Hospital, American Hospital and Alexian Brothers' Hospital.

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dition associated with splenomegaly, anemia, esophageal varices, leukopenia and ascites. However, today we refer to the term Banti's syndrome, which we think is associated with obstruction in the portal system. Whipple was able to produce Banti's syndrome by blocking the portal vein experimentally. Since the esophageal veins in the submucosa are constantly exposed to trauma and are prone to lead to fatal bleeding from massive hemorrhage, it becomes imperative to institute early and adequate treatment.

Diagnosis.—Any massive bleeding (hematemesis or severe melena) from the gastrointestinal tract should make one suspicious of esophageal varices. Melena rarely may be the first symptom, since bleeding may occur elsewhere in the gastrointestinal tract, especially in the stomach, where large dilated veins are frequently encountered. Portal hypertension, therefore, should always be considered in the differential diagnosis of hematemesis or melena. Physical examination usually reveals an enlarged spleen, the so-called "congestive splenomegaly" suggested by Larrabee. Hemorrhoids also develop owing to the anastomosis between the superior hemorrhoidal plexus and the middle and inferior hemorrhoidal veins. The so-called spider angiomas of the abdominal wall are also signs of portal hypertension. Ascites is a common observation in patients with moderately advanced and late cirrhosis. Jaundice is usually not deep, being present at some time in the majority of cases; however, it may disappear and recur intermittently. The patient of cirrhotic habitus (the man with little or no hair on his chest) should always be kept in mind, since these persons are predisposed to cirrhosis of the liver. Blood examination usually reveals secondary anemia, leukopenia and thrombocytopenia. Sternal puncture may be necessary in the differential diagnosis of blood dyscarsias. If the block is intrahepatic, liver function tests give positive results, whereas normal results of such tests indicate extrahepatic pathologic change. Roentgenologic examination is a most important diagnostic procedure and is of great value. The so-called "pearl necklace" or "beaded" pattern is quite pathognomonic. Esophagoscopic study is helpful but dangerous.

Treatment. — Moersch is enthusiastic about the injection of a sclerosing solution into the varices through the esophagoscope. He is of the opinion that patients in whom satisfactory results were not obtained were found to have varices in the cardiac end of the stomach as well as in the esophagus. Recently oxycel gauze has also been placed on the bleeding point through the esophagoscope.

Surgical Procedures: Ever since Nicolai V. Eck (1877) performed the first experimental anastomosis of the portal vein to the vena cava, surgeons have been interested in its clinical application for the relief of portal hypertension. To date many surgical procedures have been used with varying degrees of success. Ligation of the coronary vein has been tried, but has not met with great success. The Talma-Morison procedure is a form of omentopexy; this merely copies Mother Nature's plan to divert blood back to the caval circulation. Splenectomy has been advocated, since it removes 40 per cent of the portal blood. Splenic artery ligation has been performed in the extremely sick patient.

There is still some question as to which shunt operation is the best. Whipple, Blakemore and Lord, as well as Blalock, seem to prefer the portacaval shunt, since this produces the most nearly complete shunt of the portal blood and at the same time a maximum reduction of the portal hypertension. However, Linton and his associates prefer splenectomy, with an end-to-side splenorenal shunt preserving the kidney, their rationale being that this type of operation serves two purposes: first, it removes the spleen and thereby reduces the portal blood flow by as much as 40 per cent, and second, it permits an anastomosis between the splenic vein and renal vein without sacrifice of the kidney.

Portacaval Shunts: Portacaval shunts

may stop bleeding from esophageal varices which are due to portal hypertension. Some of the shunts which have been performed are: (1) the direct portacaval shunt; (2) the end-to-side splenorenal shunts after splenectomy; (3) the superior mesenteric to inferior vena cava shunts (caval mesenteric shunt); and (4) anastomosis of the inferior mesenteric vein with the ovarian vein (ovarian mesenteric shunt). Portacaval shunts have been performed as either end-to-side or side-to-side anastomoses.

Technic.—The portal to vena cava type of shunt may be performed either transabdominally or transthoracically. This work is impossible, however, without the aid of a well trained expert anesthetist.

Transabdominal Approach: Entering the abdomen through a transverse or a right rectus incision with lateral extension does have the advantage of facilitating a combined lateral and anterior approach to the portal vein. However, the common duct and the hepatic artery must be mobilized sufficiently to be kept intact. The portal vein is carefully isolated. The vena cava is exposed by combined sharp and blunt dissection from the level of the liver down past the entrance of the renal veins. The portal vein is divided close to the liver, and its hepatic end is ligated. The other end is passed under the common duct and is placed alongside the exposed inferior vena cava. A clamp is placed on the vena cava which only partially occludes it, and an end-to-side, intima-to-intima anastomosis is performed.

Transthoracic Approach: This approach is accomplished through the right hemidiaphragm and has certain advantages. With the patient lying on his left side, a direct lateral view of the hepatoduodenal ligament can be obtained through the thoraco-abdominal approach. The peritoneum can be incised directly over the portal vein and the latter isolated without disturbing the common duct or hepatic artery. The vena cava is exposed through an incision of the peritoneum directly over it. After incision of the peritoneum the vena cava bulges forward so that it touches the portal vein; this permits a side-to-side anastomosis of the portal vein to the vena cava without tension. This anastomosis is preferable to the end-to-side type because (1) some flow is still permitted to go through the portal vein, and (2) a lessened tendency to thrombosis of the portal vein is present.

SUMMARY

1. The recent advances in surgical and medical treatments for portal hypertension are discussed. Reference is made to the various portacaval shunts.
2. Many of the differential diagnostic features are evaluated.
3. The transabdominal and transthoracic approaches for portacaval anastomoses are described.

RESUMEN

1. Se discuten los recientes progresos en los tratamientos quirúfgicos y médicos para la hipertensión portal.
2. Se valoran muchos de los hechos inherentes al diagnóstico diferencial.
3. Se describen las vías transabdominal y transtorácica para la anastomosis porta-cava.

RIASSUNTO

1. Vengono esposti i recenti progressi della cura medica e chirurgica dell'ipertensione portale. Vengono ricordati i vari tipi di circuito portocavale.
2. Vengono valutati molti elementi per la diagnosi differenziale.
3. Vengono descritte le vie di accesso transaddominali e transtoraciche per l'anastomosi porta-cava.

ZUSAMMENFASSUNG

1.) Neue Fortschritte auf dem Gebiete der chirurgischen und medizinischen Behandlung des Pfortaderhochdrucks werden eroertert. Auf die verschiedenen Methoden der Anastomosierung zwischen der V. cava und dem Pfortaderkreislauf wird hingewiesen.

2.) Viele der differentialdiagnostischen

Merkmale werden auf ihren Wert hin geprueft.

3.) Die abdominellen und thorakalen Zugangswege zur portocavalen Anastomosierung werden beschrieben.

RÉSUMÉ

1. L'auteur discute des progrès récents réalisés dans le traitement médical et chirurgical de l'hypertension portale. L'auteur rapporte divers procédés de dérivation.

2. Le diagnostic différentiel est aussi discuté.

3. La voie trans-abdominale et trans-thoracique sont décrites.

SUMÁRIO

1. Os recentes progressos do tratamento médico-cirúrgico da hipertensão porta são discutidos nêstes trabalho, sendo feita especial referencia ao sistêma porta cava;

2. Muitos dos diagnosticos diferenciais são apreciados quanto ao seu valôr;

3. São descritas as vias de acésso trans-abdominais e trans-torácicas para a anastomose porta cava.

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The Present Status of Esophageal Surgery

MAURICE G. BUCKLES, M.D., F.A.C.S., F.I.C.S., D.A.B.T.S.*
COLUMBUS, OHIO

THE surgical management of numerous esophageal conditions has been described in the literature during the past decade. Many duplications occur among diagnostic methods, indications, technics and methods of management, all of which create a broader understanding of that portion of the gastrointestinal tract.

It has long been known that continuity of the upper food passages is essential to metabolic balance, and even to survival. Intricate knowledge of the anatomic and physiologic facts is essential. Much credit is due Sweet and Churchill,[1] Torek, Wamgensteen, Streider,[2] Gerlack, Ochsner,[3] DeBakey, Thorek,[4] and many others for their work in this field.

The esophagus (Fig. 1) is that portion of the upper part of the gastrointestinal tract extending from the hypopharynx at the level of the arytenoid cartilages of the larynx and continuation of the mucous membranes of the pharynx onto the larynx, to the cardiac end of the stomach. It traverses the entire chest in the posterior mediastinal plane just anterior to the vertebral column; extends through the diaphragm, at the hiatus, into the abdominal cavity, and unites with the cardiac end of the stomach, thus having two portions; proximally the thoracic portion, and distally the abdominal portion.

The esophagus normally is a collapsed tube about 10 inches (25 cm.) long. It deviates slightly from right (proximally) to left (distally). There are four sites of normal constriction. The first is the upper

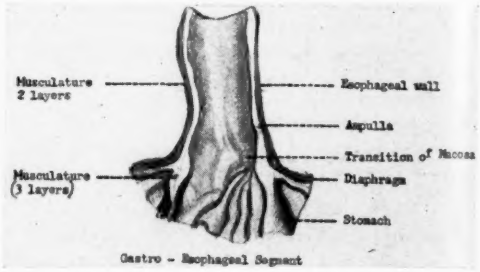

Fig. 1.—Anatomic sketch.

sphincter, known as the cricopharyngeus muscle, which is circular and keeps the inlet closed except on deglutition. The second site is the arch of the aorta; the third, the left common bronchus; and the fourth, the distal portion, which also has a sphincter-like action supplied by its own musculature, the diaphragm and the cardiac end of the stomach. This is known as the gastro-esophageal segment and will be referred to later.[4b]

The esophagus has the physiologic property of remaining closed except on deglutition or eructation of contents. Expansion may take place to a great degree in any portion. There is a normal peristalsis, with the property of contraction and expansion in length. The sensation of esophageal pain is that of deep sensibility derived from the autonomic nervous system. The physiologic adaptability of the organ, as it accommodates to deglutition, temperature, eructations and vomiting with a relative degree of safety, is remarkable.

The esophagus is lined with squamous cell epithelium, and at the distal end this blends into the epithelium of the stomach. At times, "islands" of gastric mucosa may extend as far up as the middle portion: this is of clinical importance in the explanation of adenocarcinomas arising from esophageal mucosa.

*Assistant Professor of Thoracic Surgery, Ohio State University; Chief of Thoracic Surgery, Benjamin Franklin Hospital; Consulting Thoracic Surgeon, Ohio Tuberculosis Hospital; Senior Surgical Staff Member, Mt. Carmel Hospital, Grant Hospital and White Cross Hospital, all of Columbus.

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The muscle layers are two, the inner having a circular arrangement and the outer a more longitudinal or oblique arrangement. The fibers are of both smooth and skeletal muscle, taking origin from the cricopharyngeus, other esophageal fibers, external muscles of the larynx, or any other musculature in the vicinity. The distal fibers tend to come together about 1 inch (2.5 cm.) above the diaphragm to form a more nearly circular arrangement, which contributes to the gastroesophageal segment. The paucity and poor arrangement of the muscle fibers tends to leave the submucosa and the mucosa exposed and may be a significant factor in the formation of diverticula.

The blood supply is better than was originally thought. This has been shown experimentally by McManus, Dameron, and Paine[5] and has been verified by clinical experience.

The distal portion derives its blood supply from the celiac plexus, the middle third directly from the aorta, and the upper portion from the thyrocervical trunk, namely the inferior thyroid artery. Fortunately there is sufficient overlapping to provide a fairly good safety margin at all levels.

There is no serosa. This lack of an outer covering has great surgical importance, first, from the standpoint of protection to the organ, and second, because of the difficulty imposed in anastomosis with other structures.

The nerve supply is entirely from the autonomic nervous system. The vagus enters the thorax via the carotid sheaths, and both right and left give off the inferior laryngeal nerves, which return to supply the intrinsic muscles of the larynx. These same nerves give off various minute innervations to the cervical portions of the esophagus.

The vagi then form a plexus, anterior to the esophagus at about the level of the aorta, at which site they unit with fi-

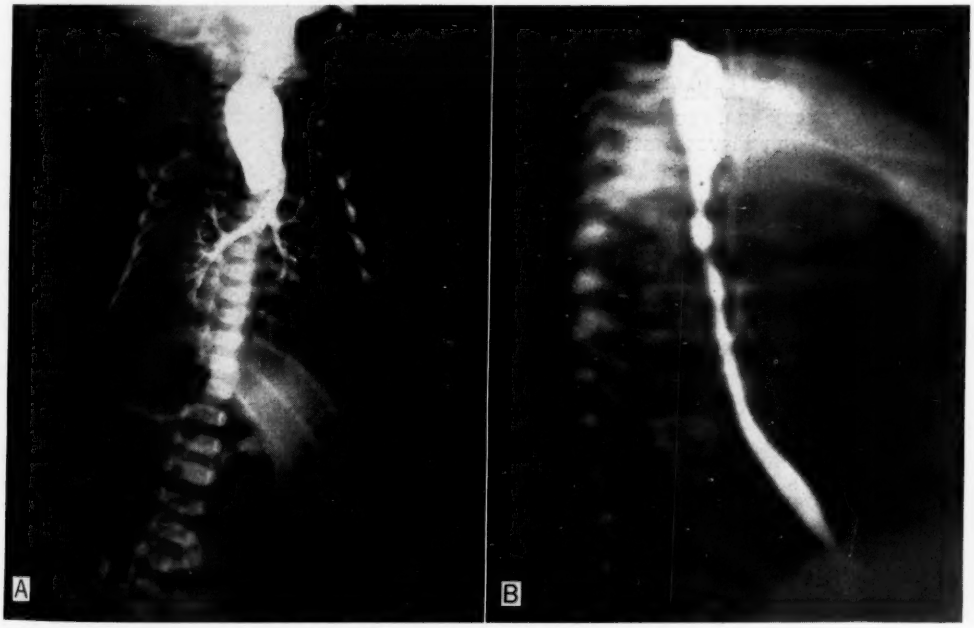

Fig. 2.—Esophageal atresia with tracheo-esophageal fistula. Premature (7½ months), weight 3¼ pounds (1,389 Gm.). *A*, before repair; *B*, after repair. Note spillage of lipiodol into trachea and bronchi.

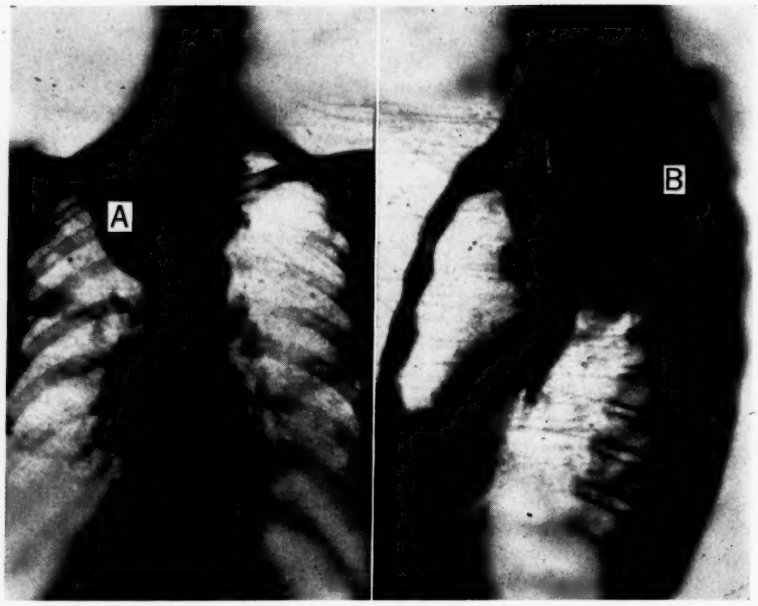

Fig. 3.—Large esophageal pulsion diverticulum. The patient was 73 years of age, and the condition had been erroneously diagnosed as cancer of the esophagus on the symptoms alone. The sac held 900 cc. of barium and was readily removed. *A*, front view of diverticulum; *B*, lateral view.

bers from the sympathetic trunk to supply the entire esophagus, both motor and sensory. The vagus nerves continue as two separate trunks (after giving off the pulmonary branches) and follow either side of the esophagus to enter the abdomen at the hiatus. At this point they divide into several branches which continue to supply the abdominal viscera.

The lymphatic supply is somewhat baffling and offers great difficulty in the presence of carcinoma of the esophagus. Surgeons are becoming more and more aware of the intricacies as experience grows. The number of metastases following resection for carcinoma is great, as is the incidence of extension and involvement of surrounding structures observed at the time of operation. The communications with the hilar lymphatics, those of the glands surrounding and involving the stomach, the cervical region, and the more distal sites make the surgeon realize that this is one of his greatest problems in the management of esophageal carcinoma.

The esophagus is at all times in action, with respiratory and circulatory motion. The alterations in intrathoracic and abdominal pressures are constantly affecting the physiologic state of the esophagus.

It was implied earlier that the gastroesophageal segment is important. The true physiologic nature of this area is not fully understood but has taken on great clinical significance because it not only deals with deglutition but controls such factors as retention of acid contents of the stomach, eructation of gases, eructation of food, etc., so that interruption of its function becomes important and restoration to a satisfactory level is difficult.[4a]

Formerly surgeons thought only in terms of establishing continuity of the food passage. Now, however, owing to certain complications such as postoperative esophagitis, ulceration, tendency toward stricture, substernal discomfort, etc., it is realized that conservatism and

careful efforts directed toward meticulous repair of this area are important; otherwise the end results may leave much to be desired. This, of course, includes the preservation and restoration of the hiatus through the diaphragm.

It is obvious that several surgical difficulties associated with carcinoma of the esophagus are its inaccessibility, the organ's lack of serosa, the tendency toward early invasion of surrounding structures, the diffuse lymphatic communications and moderate blood supply of the region, the constant motion of the organ and, finally, the problem of conserving and restoring physiologic function.

Bradshaw, Postlethwait and others have made experimental contributions.[6] Better understanding of the aforementioned difficulties, combined with meticulous technic, postoperative physiologic rest of the part and adequate re-aeration of the lungs, with particular reference to constant cleansing of the tracheobronchial tree of secretions per catheter, bronchoscope, or tracheotomy if necessary,[7] may be expected to improve results. Careful consideration of chemical balance (sodium, potassium, proteins) is absolutely necessary.

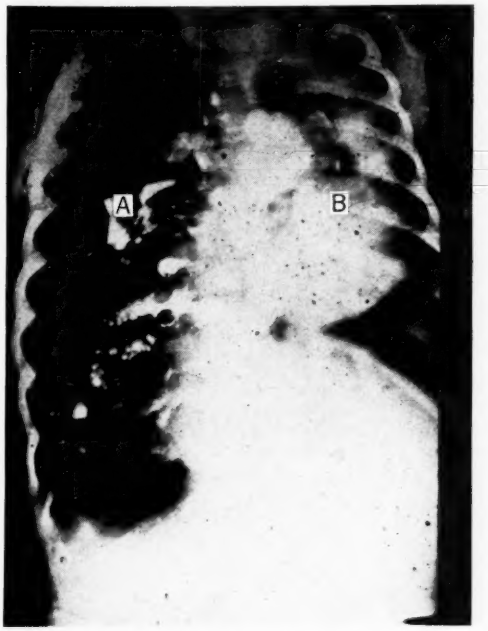

Fig. 5.—Newborn infant with dyspnea. The heart is displaced to the right. The ingestion of lipiodol shows the small bowel to be in the chest. *A*, ingested lipiodol; *B*, heart (displaced).

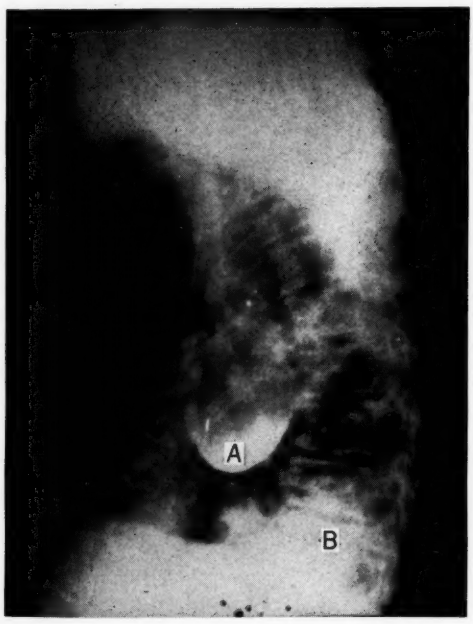

Fig. 4.—Traction diverticulum of midesophagus (lateral view) associated with bronchiectasis of the right lower lobe. Removal of both the diverticulum and the lobe resulted in cure. *A*, diverticulum; *B*, bronchiectasis.

With a broader perspective including postoperative management, surgical treatment of the esophagus has attained a satisfactory level.

Diagnostic Criteria.—The slightest suggestion in a patient's history of any difficulty in swallowing demands investigation. This is true of patients in all age groups. The ingestion of a contrast medium is the most important form of investigation, and the easiest to do. Iodized oil should be used for the newborn and barium for older patients. This is done under careful fluoroscopic guidance, followed by the taking of indicated roentgenograms. I perform routine barium swallow tests of

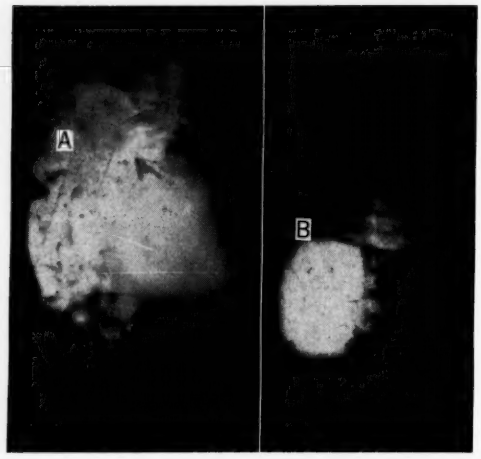

Fig. 6.—*A*, "upside-down" stomach in a newborn infant before repair. Absence of the diaphragm was encountered, so that the use of endothoracic fascia, fascia lata, and some muscle fibers was resorted to. *B*, diaphragm repaired.

all new patients examined for thoracic complaints.

The esophagoscope[7b] is used to determine the character of the lesion and its exact location, and frequently, in cases of carcinoma, a biopsy specimen can be obtained. The esophagoscope, however, is not infallible, and evidence obtained by its use should not be considered absolute.

Congenital Anomalies.—Congenital anomalies are not infrequent and contribute considerably to infant mortality. Numerous conditions occur, such as (a) tracheoesophageal fistula with atresia; (b) duplication of the esophagus; (c) congenital stenosis; (d) web formation; (e) enteric cysts; (f) esophageal cysts; (g) congenitally short esophagus, and (h) extrinsic pressure due to cardiovascular anomalies (Gross è Kenhauser,[8] Potts,[9] Sweet,[10] Whipman and Foggi[11]).

The most important and most common

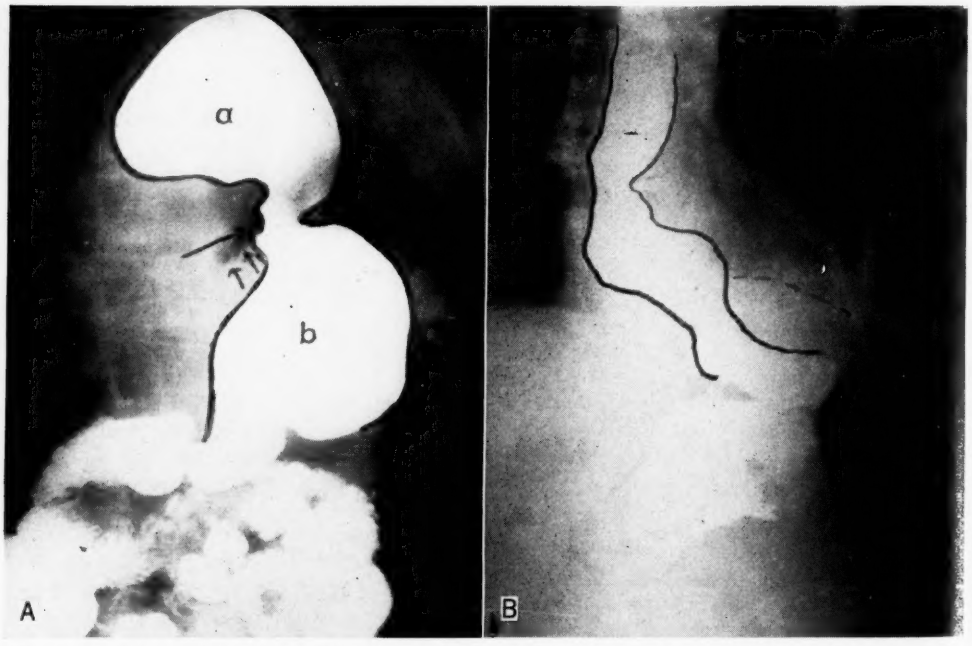

Fig. 7.—Diaphragmatic hernia with ulcer and complete obstruction to swallowing solids. The upper segment and scar tissue were resected. (*A*). The two segments of the stomach, above (*a*) and below (*b*) the diaphragm are shown. *B*, postoperative film. There was complete relief of symptoms. The patient is 75 years of age.

congenital defect is tracheo-esophageal fistula with atresia (Fig. 2). This is an embryonal defect in which there is failure of cleavage formation between the trachea and the esophagus. A blind pouch is present above, with tracheo-esophageal communications to the distal segment. Several variations of this condition occur. The surgical problem, however, is to effect continuity of the proximal and distal segments. Haight has given the greatest contribution in this field, developing a satisfactory technic for this condition.[12]

Restoration of the food canal in the newborn is best done by opening the right side of the chest between the scapula and the spine, and dividing the posterior ends of the third, fourth and fifth ribs. These are retracted and the posterior mediastinum exposed extrapleurally. The upper esophageal segment is identified and delivered if possible.

The distal segment, which is much smaller, communicates with the trachea, usually at the bifurcation. The esophagus is divided from the trachea, and the trachea is repaired with small silk sutures. The distal end of the upper portion is incised and anastomosed to the upper end of the distal segment. This is done over as large a uretral catheter as the distal segment will accommodate. The upper end of the catheter is brought out through the mouth by the anesthetist.

A gastrostomy is performed for two reasons: (1) to permit the escape of air and gas, and (2) to maintain nutrition.

This condition constitutes a surgical emergency, before contamination of the lungs takes place (Lyons and others.[13]). Dehydration soon follows. The symptoms produced are strangling, inability to swallow properly, obstruction to a gavage tube, and cyanosis.

Esophageal Diverticula.—Pulsion diverticulum of the neck has been satisfactorily repaired or removed for several years. This is, in reality, a herniation of the mucosa and submucosa just below the cricopharyngeus muscle of the proximal end of the esophagus, forming a protrusion of varying size posterior to the

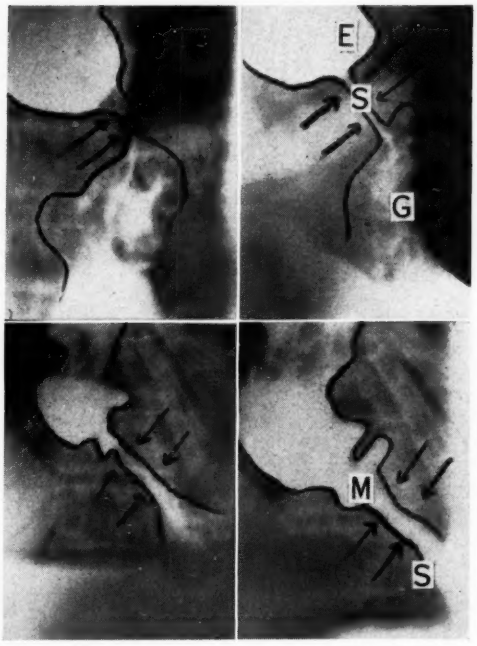

Fig. 8.—M.Y., aged 50. Preoperative (above) and postoperative (below) films. Obstruction was relieved by myotomy of the esophagogastric segment. In upper left, *E* represents the esophagus; *S*, the stricture, and *G*, the stomach.

esophagus and frequently displacing it anteriorly. The pouch usually, though not always, points to the left (McNealy, McAllister[13]).

The symptoms vary with the size of the pouch. Among them are difficulty in swallowing, regurgitation of food and liquids at a high level, and a sensation of air or gas in the neck, accompanied by foul odors upon release of air from the sac. The loss of weight is considerable at times, and malnutrition ensues.

Treatment consists of removal of the sac. This is done in one stage. An incision is made anterior to the left sternomastoid muscle. With blunt dissection the larynx and the thyroid are exposed and retracted to the right, and the esophagus is identified. The pouch is located posteriorly, and is white and glistening, having no muscular covering. The distal portion is freed, and the base of the neck of the attachment

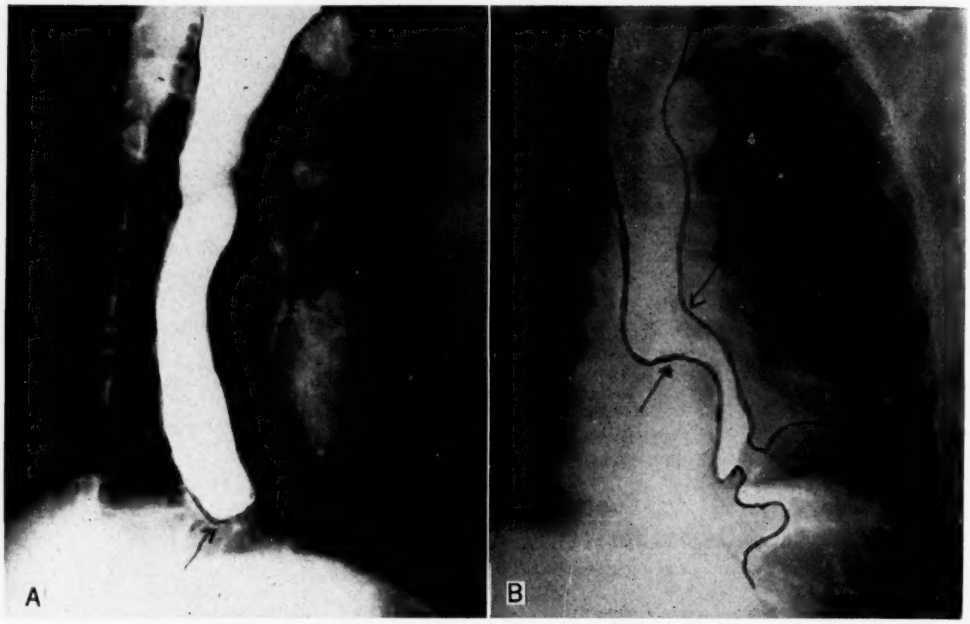

Fig. 9.—J.E., aged 71, had had cardiospasm for thirty years. Obstruction was relieved by removal of the esophagogastric segment and anastomosis of the esophagus to the stomach. (Hawthorne and Davis; Buckles.)

is developed, with avoidance of the inferior laryngeal nerve. An esophagoscope is then passed from above into the true esophagus, and the diverticulum is removed close to the scope. A repair is made with a purse-string suture and reinforced with fine silk sutures. The wound is closed with a small rubber tissue drain. A Levine tube is left *in situ* for three days, after which time the patient is started on liquids for twenty-four hours and then given solid foods. The patient is up on the first postoperative day. The results are dramatic and highly satisfactory. The recurrence rate is less than 3 per cent.

Traction diverticula usually occur within the chest and are usually associated with surrounding pathologic change, such as pathologic lymph nodes, calcium deposits, bronchiectasis, etc. I have recently operated on 2 patients with esophagobronchial communications. One required a lobectomy also, owing to resultant pulmonary abscess. Recovery was uneventful.

Diaphragmatic Defects.—Defects of the diaphragm, though not truly esophageal, are problems of the upper part of the gastrointestinal tract and should be mentioned in this discussion. Such defects are usually congenital and represent inadequate or incomplete embryonic development.

Lack of fusion of the leaves, weakness of the leaves or absence of the leaves may occur. Herniation of abdominal viscera may take place through the esophageal hiatus owing to weakness of the wall. All such defects result in the neutralization of intrathoracic pressures by abdominal viscera, with varying degrees of embarrassment of respiration or cardiorespiratory physiologic function. Surgical repair should be instituted as soon as the diagnosis is made, as such weaknesses increase rapidly, especially in infants (Fig. 5) and with the gaseous distention that may take place rapidly, death may ensue. Whenever a roentgenogram of a newborn infant shows air in the chest, lipiodol should

be ingested in order to exclude possibility that the stomach or bowel is in the thoracic cavity. The "upside down" stomach is the result of such weakness (Fig. 6).

Diaphragmatic hernias (Fig. 7) may cause pain simulating angina. Substernal discomfort, epigastric bloating, dysphagia and even dyspnea may occur.

The ingestion of barium in the Trendelenberg position is important. In some cases, loops of small or large intestine may be in the hernia, so that adequate time must be given for the barium to traverse the entire bowel. Ulceration with constriction may be a complication.

Cardiospasm produces regurgitation of food, burning in the chest, and varying degrees of pain. It is most common in young adults and is frequently attributed to psychogenic factors, such as insecurity. The condition is characterized by constriction of the cardia with resultant dilatation above.

In the presence of cardiospasm, food does not enter the stomach but remains in the esophagus until the spasm has partially subsided or regurgitation has occurred.

Approximately 75 per cent of patients are relieved by dilations of the segment, but surgical intervention is necessary for the remaining 25 per cent (Fig. 8). This consists either of severing the muscle fibers of the distal segment and permitting the mucosa to herniate through, or of esophagogastrostomy, the esophagus being reunited with the fundus of the stomach. The latter procedure is preferred when extensive mucous membrane changes have taken place.

Esophageal myotomy for cardiospasm (Fig. 9) is patterned after the Ramstedt operation for congenital pyloric stenosis.

Rupture of the Esophagus, Etc.—Instrumentation leads the list of causes. Vomiting and regurgitation are the leading causes of spontaneous rupture. Vomiting associated with alcoholism seems frequent. Pathologic conditions of the esophageal wall, such as carcinoma, ulcerations, or foreign bodies, are predisposing factors.

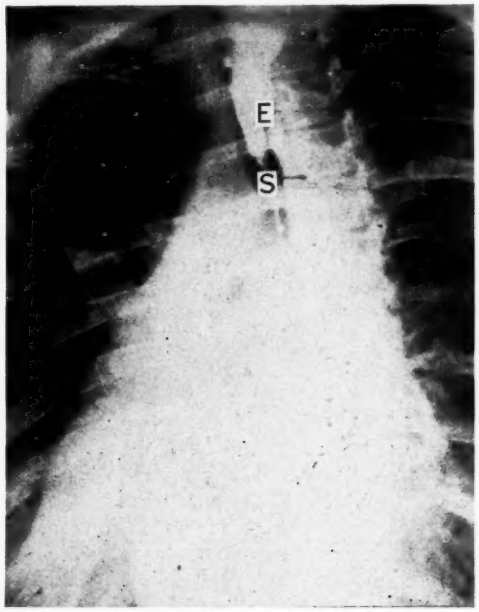

Fig. 10.—Lye stricture dilated by retrograde bougienage. *E*, esophagus; *S*, lye stricture. Patient has been well, with no clinical obstruction, for six years. At this date this patient would probably receive a jejunal transplant. It seems the thoracic route is preferable to the antethoracic route tried first by Roux in 1903 and reattempted many time. Longmire reported antethoracic use of the jejunum in the newborn.

The onset is sudden, usually with severe pain, shock, nausea, dyspnea and fever. Spontaneous pneumothorax, subcutaneous emphysema and mediastinitis may be manifest very early.

The seriousness of this condition requires astute clinical judgment as to the management of the earliest phase, followed by emergency repair of the perforation. Some patients have recovered under conservative management, but the majority have died. An early thoracotomy with primary repair, resection of the damaged segment with end-to-end anastomosis or an esophagogastrostomy may be required.

Chemical and metabolic balances should be carefully followed with regard to proteins, sodium and potassium.

Benign lesions of the esophagus producing obstruction have been described

repeatedly. It is agreed that the commonest benign growths are: (a) lipoma, (b) leiomyoma and (c) fibroma.

A large partially calcified *tubercle producing an abscess* within the esophageal wall has been reported. The treatment of the aforementioned conditions requires excision, either partial or segmental, with whatever repair of the esophagus is necessary. A few benign tumors have been removed via the esophagoscope.

Harrington, Fulton, Vinson and others have contributed to this phase of esophageal disease.

Chemical Strictures of the Esophagus (Fig. 10).—Tribute is paid Dr. Chevalier Jackson for effecting the use of a poison label on lye cans and to his early work in lye strictures (Jackson and Jackson[14]). Esophageal dilation, both direct and retrogade, was a great advance. Prevention of lye strictures is problematic. Cortisone may be of some value (Rosenberg, Kunderman and Uronan[15]).

Excision of localized strictures suffices in some cases. Tuttle has reported segmental resection with end-to-end anastomosis. Paine[16] also has reported excision of strictures. In many cases, however, the constriction is of such great extent that construction of a new food passage is required.

Rienhof, Harrison, and Wangensteen have contributed to the technic of substitution of the small bowel for the esophagus.[17]

Esophageal varicosities are, in the light of present knowledge, usually due to portal hypertension. The condition usually carries a grave prognosis and an early demise. The acute onset with hemorrhage frequently demands early intervention. The use of pneumonic dilators at the cardia has not been satisfactory in my limited experience, so that in case of profuse bleeding, when a definite diagnosis has been made, thoracotomy is resorted to, with resection of the varicose portion of the cardia and esophagus, the fundus and the esophagus being reanastomosed. The spleen is removed at this time, the liver inspected, and a biopsy specimen taken in an effort to estimate liver damage. Removal of the spleen may be of some therapeutic value for patients with Banti's syndrome. (Phemister and Humphries[18]; Boronofsky[19]; Schafer and Kettle[20]).

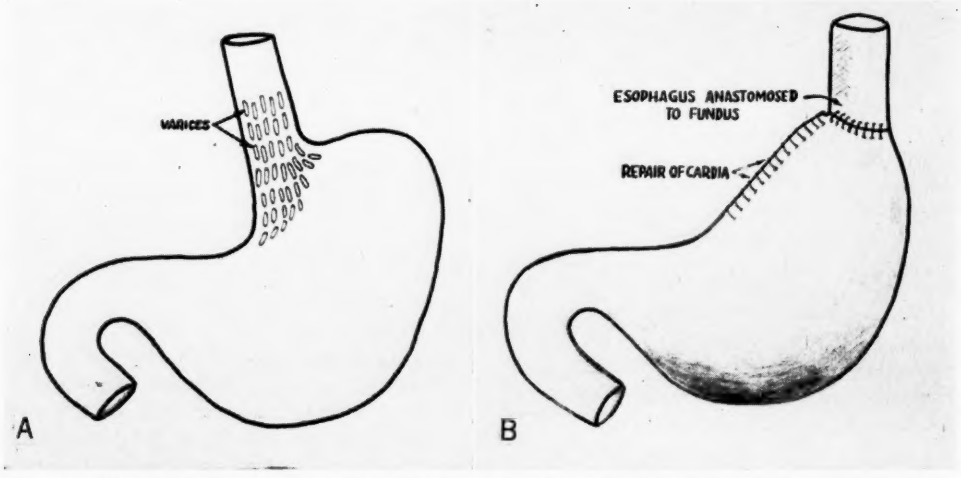

Fig. 11.—Diagrammatic representation of area removed in the foregoing case. *A*, area of varicocities; *B*, repair of cardia and anastomosis of esophageal fundus. Remaining gastric and esophageal mucosa appear normal. Owing to the excellent condition of the patient, a portacaval shunt has been deferred.

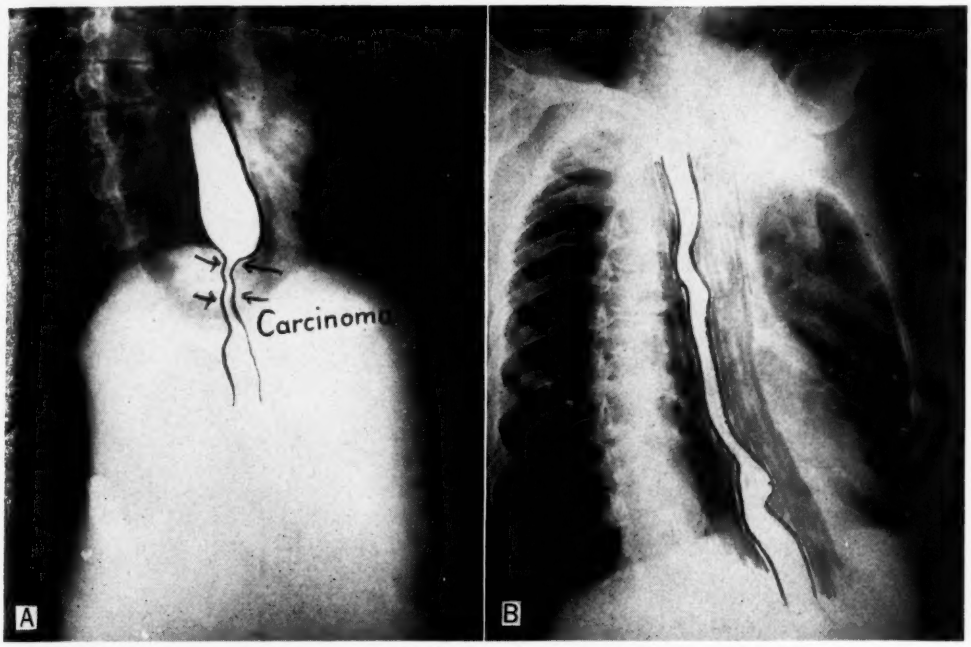

Fig. 12.—*A*, squamous cell carcinoma of the distal end of the esophagus. Operation was performed in January 1947. *B*, recent postoperative film. The patient is living and well. This is the one five-year survival in my series.

One case is here reported (Fig. 11) in which the varicose portion was removed in conjunction with splenectomy. No definite disease of the liver could be demonstrated, and the patient is living and well after three years.

Portacaval shunt is probably indicated in most cases.

Carcinoma of the esophagus (Fig. 12) is a dreaded entity. Considerable data is available at present and clearly shows that the end results are far from ideal. In my small series of 72 cases of proved esophageal carcinoma, there was only 1 five-year survival.

This corresponds with the reports of other authors most of whom seem to have obtained 1 or 2 five-year survivals. It is my impression that roentgen therapy and gastrostomy have been of little value in prolonging life or relieving symptoms.

Radical resection of the esophagus for cancer, although not remarkably successful, is by far the best approach to be tried thus and its use should be encouraged rather than discouraged.

Causes for the high mortality rate may be (1) lack of experience in technic of the earlier cases performed; (2) poor selection of cases, and (3) late diagnosis. The onset is frequently insidious, but one cannot overemphasize the importance of holding the disease in mind and looking for it with all available procedures, including the ingestion of barium under fluoroscopic observation, roentgen examination and esophagoscopic study. One is always grateful to the roentgenologist or the clinician who carefully observes the esophagus.

I feel that any suspected but not proved obstruction should have the benefit of an exploratory thoracotomy. Waiting for further clinical developments may prevent an otherwise good result.

Surgical resection may be made via either the right or the left side of the chest. My experience has been via the left

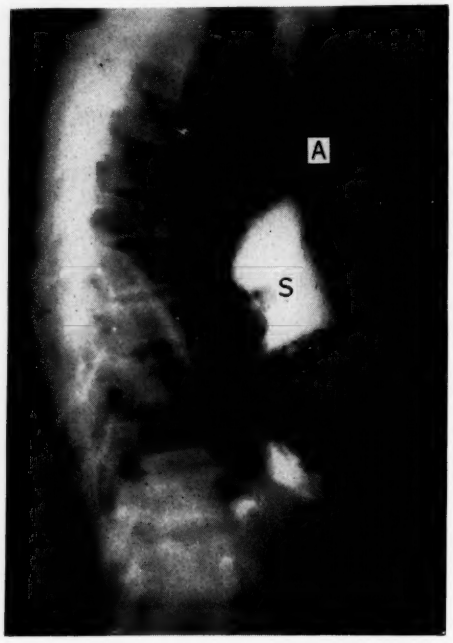

Fig. 13.—Postoperative lateral view of cancer of middle third of esophagus, showing stomach anastomosed to upper third, anterior to aortic arch. *A*, site of anastomosis above aortic arch; *S*, stomach.

side, the mobilization of the stomach plus the resection being done at one operation, as advocated by Sweet. Others propose a two-stage procedure; the first, mobilization of the stomach or the jejunum, and the second, performance of the anastomosis. Still others advocate simultaneous mobilization of the stomach and the right-sided approach to resection.

Gibbon, Albritton and Templeton[21] reported significant data concerning 89 cases. Ochsner, BeBakey and others[13] presented in 1949 an analysis of 244 cases, in 101 of which operation was performed.

Continued effort must be devoted to surgical treatment of the esophagus. Inroads have been made, and further endeavor should be encouraged.

A plea is made to the practitioners of medicine, who see the patient first, to bear the disease in mind, and make every effort to arrive at the earliest possible diagnosis.

In case of doubt as to carcinoma, an exploratory laparotomy should be performed, since procrastination may defeat a good result.

Cancer of the lower third of the esophagus offers the best prognosis, and cancer of the middle third second best (Fig. 13). Cancer of the cervical portion (Fig. 14) offers the gravest prognosis. I operated for this condition in 3 cases.[26] All of the patients survived the operation. One survived for one and one-half years, 1 for four months and 1 for 2 months. All died of metastatic lesions, and all of the tumors were of the squamous cell type.

In the last 2 cases the mobilized stomach was brought through the left side of the chest, and out under the sternum, anterior to the trachea (Fig. 14*B*). This seems easier than through the cupola of the left side of the chest as in Fig. 14*A*.

Unfortunately, I have no films of the patient in Case 3 which would reproduce. In this case only a very small rim of the esophagus was available for anastomosis, so the pharyngeal mucosa was also used.

A personal communication from Dr. André Crotti tells me that he has removed a segment of the cervical portion of the esophagus which showed invasion from a thyroid gland with malignant disease. The patient survived for nine years.

SUMMARY

A brief anatomic and physiologic discussion of the esophagus is presented. Various esophageal conditions are discussed, including (1) the normal state, (2) congenital abnormalities, (3) acquired pathologic conditions (with some diagnostic criteria) and (4) surgical technic. Preoperative and postoperative observations are included, with illustrations.

RIASSUNTO

Breve studio anatomico e fisiologico dell'esofago, con discussione clinico-diagnostica. Vengono presi in esame, volta

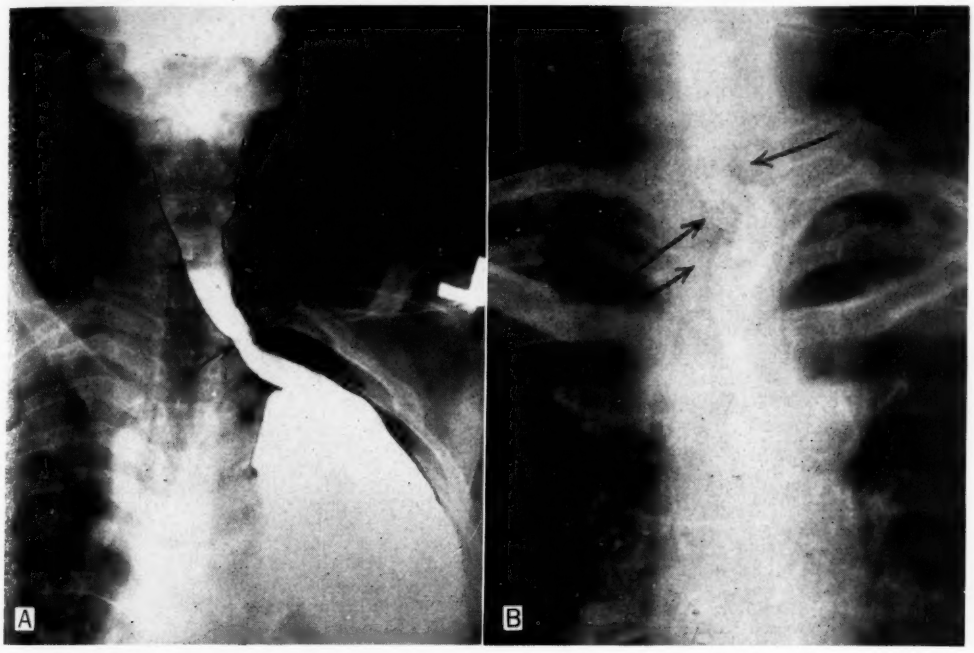

Fig. 14.—Roentgenograms showing site of anastomosis of stomach to cervical portion of esophagus in 2 cases.

a volta, accompagnati da dimostrativa iconografia personale, i diverticoli esofagei, lo stomaco "rovesciato," l'ernia diaframmatica, il cardiospasmo, le stenosi chimiche, le varici e il cancro dell'esofago.

SUMÁRIO

O autôr faz um estudo resumido do esofago, sob os seus aspétos anatômico e fisiologico, antes de apresentar ilustrado por várias fotografias, o criterio do diagnostico, descrevendo separadamente o diverticulo do esôfago, o estomago de "cima para baixo," a hernia diafragmatica, o cardio-espasmo, as varizes do esôfago e o carcinôma esofagiano.

RÉSUMÉ

L'auteur étudie brièvement l'anatomie et la physiologie de l'oesophage. A l'aide de photographies de sa collection personnelle, l'auteur s'étend sur cette pathologie des diverticules de l'oesophage, de l'estomac "inversé", de l'hernie diaphragmatique, du cardiospasme, des rètrécissements de l'oesophage, des varices et du cancer.

ZUSAMMENFASSUNG

Einer kurzen Untersuchung der anatomischen und physiologischen Verhaeltnisse der Speiseroehre folgt eine Eroerterung diagnostischer Merkmale. Es werden der Reihe nach Divertikel der Speiseroehre, Umkehrungen des Magens, Zwerchfellbrueche, Kardiospasmus, Veraetzungsstrikturen der Speiseroehre, Oesophagusvarizen und Speiseroehrenkrebse besprochen. Die Arbeit ist mit erlaeuternden Photographien aus der Sammlung des Verfassers ausgestattet.

RESUMEN

A un breve estudio sobre los aspectos anatómico y fisiológico del esófago sigue una discusión sobre criterio de disgnóstico. Se discuten e ilustran fotográficamente divertículo esofágico, "caída gástrica superior", hernia diafragmática, cardioespasmo, estenosis química del esófago, varicosidades esofágicas y cáncer del esófago.

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For information pertaining to qualifications for

Fellowship, Associate Membership or Junior Membership in the

United States Section, International College of Surgeons

please communicate with

Dr. Karl A. Meyer, F.A.C.S., F.I.C.S.

1516 Lake Shore Drive

Chicago 10, Illinois

Pectus Excavatum

PETER E. REES-DAVIES, F.R.C.S. (ENGLAND), F.R.C.S. (CANADA), F.I.C.S.
VANCOUVER, B. C., CANADA

THE deformity known as funnel chest is distinguished by a bizarre nomenclature, depending upon the language used. *Chonē koilosternia* is the Greek; *pectus excavatum*, meaning hollow chest, is the Latin; *Trichterbrust*, the German; *thorax en entonnoir*, the French. The term *pectus infundibuliforme* and several more are used as well. The simple English term *funnel chest* seems to describe the condition satisfactorily and will be used in this paper.

Funnel chest is a congenital deformity of the thoracic cage in which the sternum and costal cartilages are depressed. The greatest depth of the hollow is at the xiphisternal joint and is accompanied by maldevelopment of the ventral aspect of the diaphragm. In extreme cases the sternum may be within 2 or 3 cm. of the vertebral bodies.

History.—Modern interest in this condition dates from the end of the last century, when a few cases were reported by the Austrian and German schools.

The first description of the condition is attributed to Bauhinus[1] in 1596.[2] This physician observed the condition in a 7-year-old boy. His description of the causative pathologic factors differed in no way from that accepted today.

Anatomic Picture.—The sternum, or breast bone (*sternon*-breast) is described in three parts. The manubrium is the upper triangular part articulating with the clavicles and the first and second costal cartilages. It is fixed in position and connected to the gladiolus by a cartilaginous joint that fuses in old age.

The *gladiolus*, or body, consists of four segments in cartilage, which fuse during youth, and articulates with the second to seventh costal cartilages.

The *xiphoid* consists of cartilage with a core of bone which becomes ossified late in life and fuses with the gladiolus at sometime during middle age.

A careful study of the anatomic nature of funnel chest by Brown[2] has produced a rational explanation of the cause of the condition. He found that the fascial fibers of the linea alba extend upward on the posterior aspect of the sternum, forming a strong band which he has named the substernal ligament. This ligament is intimately related to the two strips of diaphragm which originate from the back of the xiphoid process and are inserted into the central tendon of the diaphragm. In addition, the diaphragm has fleshy strips arising from the lower six costal cartilages and the first three lumbar vertebrae.

It has been observed that the apex of the funnel is always the xiphisternal joint. The structures that produce this depression are the two strips of origin of the anterior *diaphragm* already mentioned. It is found that shortening of these slips is the cause of the condition. Later a deformity of the costal cartilages and ribs occurs and becomes permanent.

Etiologic and Pathologic Aspects.—The condition occurs in about 1 in 16,000 of the population[3] and in the ratio of four males to one female. True funnel chest is a congenital deformity and is frequently familial. Various causes of the deformity have been put forward:

1. Abnormal or deficient development of the sternum and costal cartilages.
2. Intrauterine pressure by a limb upon the sternum.
3. Respiratory obstruction, as from enlarged tonsils and adenoids.
4. Nutritional deficiency, such as rickets.
5. Trauma, either a single severe injury or a series of small ones.

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6. Inflammatory disease and adhesions in the mediastinum.
7. Hereditary syphilis.
8. Faulty posture.

While any of these may be contributory factors, none is sufficient in itself to produce the condition.

Brown[2] in 1939 showed that the condition was caused by congenital shortening of the sternal portion of the diaphragm, which is intimately connected to the xiphoid cartilage, the substernal ligament and the linea alba. He based his surgical correction on this anatomic premise and obtained good results.

The diaphragm is developed in four parts: anteriorly from the septum transversum, laterally from the pleuroperitoneal membranes and posteriorly from the dorsal mesentery. These form the muscular components arising from the periphery of the bony thoracic outlet to be inserted into the central tendon. It is the property of muscle that when it contracts its origin is fixed and the pull is transmitted to its insertion. On inspiration these muscular portions contract and the central tendon is depressed, but no tension is exerted on the bony origin.

In the presence of funnel chest there is faulty development of the musculosternal portion of the diaphragm, and when inspiration occurs the xiphisternum is drawn in, causing paradoxic respiration. The degree of retraction is proportional to the degree of muscular deficiency in the anterior portion of the diaphragm. As the child grows older the retracted xiphisternal joint fails to return to its natural position, the costal cartilages become deformed and the sternum remains depressed. After the age of 3 years the deformity becomes permanent.[4]

It has been shown that other deformities of the thorax, such as pigeon chest, costal asymmetry and Harrison's sulcus can be traced to maldevelopment of the corresponding portion of diaphragm.

Symptoms. — Symptoms are usually lacking in the early stages, the child being brought to the doctor by his parents because of the obvious deformity. Later, as the deformity increases and becomes fixed, symptoms arise as a result of pressure and distortion of the underlying viscera.

Symptoms Referable to the Cardiovascular System: Interference with the cardiovascular system produces a variable degree of embarrassment. If the heart is pushed aside, usually to the left, the effects of pressure are small but the great vessels become distorted. If the heart is held in the midline by the sternopericardial ligaments, its intake and output are more seriously interfered with, and heart failure results. This explains the puny, hyposthenic appearance of some of the children affected. Systolic murmurs may be heard but are of little significance. Arrhythmias and paroxysmal tachycardia may occur. Electrocardiograms may show axis deviation from rotation of the heart and inversion of the T wave. The symptoms complained of may be undue fatigue, palpitation, shortness of breath on exertion and *precordial pain.*

Symptoms Referable to the Pulmonary System: Compression of the lungs can decrease the respiratory excursion and affect the vital capacity. This may give rise to cyanosis and dyspnea (especially on exertion) and predispose to infections of the respiratory tract, such as tuberculosis and bronchiectasis.

Appearance. — There is considerable psychological effect on sufferers from this condition when they attain school age. Any unsightly variation from the normal is commented upon and causes misery to the child. Furthermore, in these days of contracting bathing dresses even inflatable gay deceivers are a poor substitute for the genuine article.

Treatment.—In the past this condition has been recognized and dismissed. The victims, with a few exceptions, have seemed able to adapt themselves to normal life. Nevertheless, pathological conditions can result, and in the same way as he who has never loved does not know what he has missed, so the funnel-chested person who has never had a normal ex-

ercise tolerance does not know what it is to be normal.

The treatment is correction of the deformity, which can only be achieved surgically. An operation is required which will restore normal function and correct the deformity. The restoration of function is of prime importance.

Up to 2 or 3 years of age the deformity is mobile; it has not yet become permanent, nor has it caused any symptoms. The purpose of operation at this age is to prevent the deformity from becoming permanent. Its correction, therefore, presents a simpler problem in the child than in the older patient whose malformed chest has become permanently ossified.

The first operation was performed by Meyer in 1911.[5] He excised part of the second and third right costal cartilages of a 16-year-old boy suffering from tuberculosis. Other procedures followed, in which various costal cartilages and parts of the sternum were incised or removed. The results of these operations were not very successful; either the deformity was uncorrected or it recurred. An attempt was then made to maintain elevation by attaching wires to the depressed sternum after freeing its attachments. Later, that end was achieved by the insertion of bone grafts. Up to 1938 some 32 operative procedures had been employed, with various results.

In 1939 Brown[2] described the anatomy of the condition and, basing his surgical attack on these anatomic principles, laid the foundation for the present-day method. There are two procedures that give good results when properly applied. These are phrenosternolysis and chondrosternoplasty.[4]

Phrenosternolysis is a procedure applicable to children up to about 2 years of age. At this time the deformity is reversible and can be corrected by this comparatively simple procedure.

Through a curved transverse incision over the xiphisternal joint the midpart of the rectus muscle is reflected from the lower costal cartilages, which are then resected. The xiphoid cartilage is brought to view and excised, and the attachment of the diaphragm to the xiphoid, the substernal ligament and the lower costal cartilages is divided. This is all that is necessary for children up to 2 years of age. A further refinement is to suture the divided diaphragm to the posterior rectus sheath.

Chrondrosternoplasty is indicated for older patients whose deformity has become fixed. An incision is made in the midline from the level of the angle of Louis to the distal edge of the xiphoid cartilage. The pectoral muscles are reflected laterally and the rectus abdominis turned down from the lower costal cartilages. Portions of the lower costal cartilages are then removed, the number involved depending on the degree of deformity—usually the third to the seventh inclusive on each side. About 1 cm. is removed, including the maximum curvature. The xiphoid is brought to view and may be removed. The attachment of the diaphragm to the posterior aspect of the xiphisternal region is divided. The sternum can then be raised, the underlying pericardium and pleura being kept in mind. A horizontal wedge of bone is then cut from the manubriogladiolar juncture. This is secured by a couple of wire sutures, thus angulating the gladiolus into the corrected forward position. A piece of gelfoam is inserted behind the sternum if there is any oozing from intercostal vessels, and the pectoral muscles are sutured across the midline. In a patient with marked deformity a costal cartilage graft may be inserted between the lower costal cartilages to maintain the sternum forward in its corrected position.

The postoperative course is usually uneventful, and the patient goes home in about eight days.

Results. — A considerable number of funnel chests have been treated surgically. Upward of a hundred cases are reported in the literature, and, although the earlier methods sometimes failed, the vast majority of patients obtained relief of symptoms.

In order to assess results the patients

should be divided into two groups: the older patients, with fixed deformity and definite symptoms, and infants without obvious symptoms. In the older group the restoration of function is good even when correction of the deformity has left something to be desired. Perhaps with the newer operative technics this too will be improved. In the infant group, when there are no preoperative physical complaints, the parents invariably proffer the information that since the operation the child has had far more energy than before. In fact, it is usually the parents who now complain!

Reports of 4 cases in which operation was performed by Dr. Appleby are here appended.

REPORT OF CASES

CASE 1.—L. W., a girl aged 15 months, had funnel chest of moderate degree that became marked when she cried. The mother stated that a grandfather and an uncle were similarly deformed. Both were great sportsmen; the one was an engineer, and the other served in the American Army. Neither was inconvenienced by the condition as far as is known. The mother had noticed nothing abnormal about the child apart from the depressed chest and the fact that she was less well developed than were other children of her age.

Examination revealed the heart to be compressed at the lower margin; there was paradoxic respiration; the cardiac ratio was greater than the thoracic. Flouroscopic study showed the heart to be enlarged to both right and left. The sternum was moderately depressed. An electrocardiogram revealed no abnormality.

In January 1951 the lower four costal cartilages were removed. The substernal ligament was divided and the sternum elevated. Osteotomy was performed at the manubriogladiolar juncture and fixed with one silk suture. Gelfoam was inserted. The postoperative course was uneventful.

The child was reexamined in May 1952. The mother stated that the child has unbounded energy. The scar was well healed, and practically no depression over the chest could be observed. The heart and breath sounds were normal, as was the heart on fluoroscopic study. The sternum was in good position. An electrocardiogram was also normal.

CAES 2.—D. P., a boy aged 6 years, was puny, thin, poorly developed and funnel-chested. His mother had noticed no other abnormal conditions. Examination revealed that the boy was below standard for boys of his age. The sternum was depressed approximately 1½ inches (3.7 cm.). There was paradoxic respiration. The breath sounds and heart sounds were normal.

Fluoroscopic study showed the heart slightly rotated to the left on the long axis, and in the left oblique anterior position the apex extended well beyond the spine. An electrocardiogram suggested myocardial damage, probably early intraventricular block. Left axis deviation was noted.

Operation, which was done in December 1951, consisted of vertical incision, excision of the lower four costal cartilages on each side, division of the xiphisternal joint and the substernal ligament, cuneiform osteotomy of the manubriogladiolar juncture, insertion of two wire sutures to hold the gladiolus forward, and insertion of gelfoam. The postoperative course was uneventful.

On reexamination in May 1952 the mother volunteered the information that she had noticed a tremendous increase in the boy's energy. She believed that he had benefited considerably; he was much stronger, and she thought him now the equal of other boys of his age.

At the time of this report the boy has a well-formed sternum. There is no depression. The respiratory movements are normal. The lungs have a full excursion. The breath sounds and heart sounds are normal. Lordosis of mid-dorsal spine is present (due to pull from abnormal dorsal diaphragm?). There is no depression of the sternum. The mediastinal contents, the heart and the lungs are normal. A postoperative electrocardiogram showed much less left axis deviation and no evidence of myocardial damage.

CASE 3.—S. E., a funnel-chested girl aged 7 years, tired easily after exercise. Examination revealed marked depression of the sternum, maximal at the xiphisternal juncture. There was limitation of respiratory excursion. The breath sounds were normal. The heart rate was increased, and the heart was enlarged toward the midaxilliary line. There was a systolic murmur. No cardiac embarrassment was noted.

Fluoroscopic study showed some rotation

of the heart, as evinced by prominence of the left border. There was little ossification in the lower two segments of the gladiolus, so that it was difficult to judge the position of the sternum. Electrocardiographic study revealed no abnormality.

Operation was performed in January 1951. The postoperative course was uneventful.

In May 1952 the child was reexamined. The father states that there has been marked improvement in her general health. She can carry out any exercise now without fatigue. The xiphisternal depression has been corrected, but there is some residual depression of the midgladiolar region. Respiration is normal, with a full excursion. The cardiovascular system is normal, as is the child's exercise tolerance. The fluoroscope revealed slight widening of the cardiac shadow and some straightening of the left border of the heart, suggesting correction of the distortion. The electrocardiogram was normal.

CASE 4.—D. B., a boy aged 14 years, stated that he became short of breath and felt tired more easily than he should. Examination revealed moderate depression of the sternum, mostly between the level of the sixth rib and the xiphoid. The cardiovascular and respiratory system showed no abnormality. Fluoroscopic study revealed little abnormality of the heart in the anteroposterior view, with possible slight enlargement. The lateral view showed the sternum depressed and curved. Right axis deviation was observed in the electrocardiogram.

Operation was performed in October 1951, with a midline incision. The lower 4 costal cartilages on each side were removed, and the xiphisternal joint and the substernal ligament were divided. The gladiolus was elevated from the anterior mediastinum.

This mobilization was much more difficult than in the younger patients, the costal cartilages, the ligaments and their attachments being much stronger and more adherent. There was greater adhesion to the pleura and the pericardium. The substernal and pericardial ligaments were stouter and more difficult to dissect.

The pleura was opened on the right side. This region was packed with gelfoam. The cuneiform osteotomy was carried out and sutured with wire. Postoperatively there were right pneumothorax and hemothorax, with a mediastinal shift to the left.

Reexamined in May 1952, the boy stated that he had been much improved since the operation; he was no longer short of breath and did not feel tired. He was able to play all the usual games and to do as well as other boys of his age. The respiration was normal, as was the cardiovascular system. There was some widening of the cardiac shadow and straightening of the border of the heart. Some depression of the sternum remained. The electrocardiogram showed right axis deviation. There has been functional improvement in this patient, although correction of the deformity is incomplete.

SUMMARY

The author presents a short review of funnel chest, with a brief report of 4 patients treated surgically.

In our limited experience operation on older patients is more difficult, owing to the inacessibility of the xiphisternal region, which has become firmly displaced inward. The costal cartilages and ligaments that have to be removed or mobilized are very much stronger and more adherent to the pleura and the pericardium.

It is suggested that, although surgical correction should be advised, this should be carried out while the patient is between the ages of 1 to 4 years, when the operation is simple, the results are good and the sequelae of the deformity are avoided.

RÉSUMÉ

L'auteur rapporte 4 cas de détrécissements thoracique traités par la chururgie. L'intervention s'avère plus difficile chez les patients plus âgés, à cause de cette difficulté d'atteindre la région xiphosternal. De plus, les cartilages costaux et les ligaments sont plus forts et plus adhérents à la plèvre et au péricarde. L'âge idéal pour pratiquer cette thérapeutique chirurgicale est le 1 à 4 ans; elle s'avère alors facile.

RIASSUNTO

Breve quadro del torace a imbuto, con relazione di 4 casi trattati chirugicamente.

L'intervento, per quanto se ne può dire

con un materiale così limitato, è più difficile nei pazienti meno giovani per la inaccessibilità della regione xifo-sternale che si è spostata e fissata solidamente all'interno. Le cartilagini costali e i legamenti che devono essere asportati o mobilizzati sono molto più robusti e aderenti alla pleura e al pericardio.

La cura chirurgica deve essere attuata, ma quando il bambino è fra 1 e 4 anni di etè, allorchè l'intervento è semplice, i risultati sono buoni e vi è possibilità di evitare le deformità postume.

SUMÁRIO

E feita uma revisão sôbre o assunto e apresentadas observações resumidas de quatro pacientes tratados cirurgicamente para correção do "torace em funil." Salienta o autôr que em sua experienca, aliás limitada, a operação se torna mais dificil nos doentes mais velhos, especialmente pelo dificil acésso à região xifo-external, devendo o ôsso sêr fortemente deslocado para dentro. As cartilagens costais e os ligamentos devem sêr removidos ou mobilizados, o que é feito com muito maior trabalho que em relação à pleura e o pericardio. Sugerem que a correção cirurgica deve sêr, preferentemente, praticada entre 1 e 4 anos, idades em que a intervenção se torna mais simples, os resultados melhores, e as sequencias da deformidade toracica mais facilmente evitaveis.

ZUSAMMENFASSUNG

Der Verfasser gibt einen raschen Ueberblick ueber das Problem der Trichterbrust und berichtet in Kuerze ueber vier chirurgisch behandelte Kranke.

Auf Grund dieser begrenzten Erfahrungen scheint die Operation bei aelteren Kranken in Folge der Unzugaenglichkeit der Xiphosternalgegend, die fest nach innen verlagert ist, schwieriger zu sein. Die zu entfernenden oder zu mobilisierenden Rippenknorpel und Baender sind bei aelteren Kranken viel kraeftiger und mit dem Rippenfell und dem Perikardium enger verbunden.

Der Verfasser schlaegt vor, dass die chirurgische Korrektur zwar empfohlen aber zu einer Zeit ausgefuehrt werden sollte, wo sie einfach ist, zu guten Resultaten fuehrt, und wo spaetere Entstellungen vermieden werden koennen, das heisst, wenn die Kranken zwischen ein und vier Jahren alt sind.

RESUMEN

Se hace una corta revisión sobre el tórax en embudo y se presenta una breve comunicación de 4 pacientes tratados quirúrgicamente.

Se estima que la operación en ancianos es más difícil, por no ser accesible la región xifoesternal, la que se encuentra desplazada firmemente hacia adentro. Los cartílagos y ligamentos costales que deben removerse o movilizarse son mucho más fuertes y más adherentes a la pleura y el pericardio.

Se sugiere que, aunque la corrección quirúrgica debe aconsejarse, ésta debe efectuarse en pacientes de 1 a 4 añnos de edad, cuando la operación es simple, los resultados son buenos y se evitan las secuelas de la deformidad.

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Postoperative Intestinal Obstruction

EUGENE F. BALANGERO, M.D., F.A.C.S., F.I.C.S.
MONTREAL, CANADA

THE purpose of this presentation is to show that intestinal obstruction is a syndrome that occurs not rarely after abdominal laparotomy and always follows a strict pattern.

The old French saying *"Rien de nouveau sous le soleil"* holds true when one reviews the literature published on this morbid condition. However, the literature also indicates that enlightened attitudes in recognition of this disease and its management have decreased the mortality rate in the last two decades.

Either intestinal obstruction or ileus is a syndrome caused by the arrest of the intestinal contents in their normal course, with the difference that ileus is a condition in which, apparently one cannot determine the presence of an organic lesion occluding the lumen of the intestine. Ileus is reflex, paralytic, dynamic, whereas obstruction is a syndrome in which an organic lesion always occludes the lumen of the distal end of the intestine. This obstruction may appear as a necessary or a fortuitous incident during the evolution of multiple or diverse pathologic conditions.

At present, however, I shall consider only obstruction occurring in patients who had undergone a surgical abdominal procedure. The clinicopathologic signs and evolution of this medical problem will be followed through, in order that recognition of early clinical signs may help in establishing a prompt diagnosis and thus insure proper and adequate treatment.

During the past four years 172 patients with intestinal obstruction were admitted to the service, and in all the mechanical nature of the obstruction was confirmed by physical examination, by roentgen films or by laparotomy.

Thirty-three of the patients were treated for mechanical intestinal obstruction (a) due to adhesions of bowel to other loops of bowel or to the abdominal peritoneum or (b) due to adhesive bands.

The age varied, as is shown in Table 1.

TABLE 1.—*Age Incidence of Mechanical Intestinal Obstruction in 33 Patients*

Age Group	Number of Cases	Percentage
0-20	0	0
20-30	10	30.3
30-40	9	27.2
40-50	9	27.2
50-60	4	12.1
60-70	1	3.3
70 and over		

We did not encounter any case in which the patient was under 20 years of age, and only 1 in which the patient was over 60. This was due to the fact that the majority of surgical operations are performed on patients between the ages of 20 and 60.

TABLE 2.—*Incidence of Obstruction After Various Surgical Procedures*

Operation	Number	Overall Percentage
Appendectomy	11	33.3
Hysterectomy	11	33.3
Cholecystectomy	3	9.9
Appendectomy and oophorectomy	3	9.9
Adhesions	2	6.6
Herniorrhaphy	2	6.6
Intestinal resection	1	3.3

Women seem more likely to have intestinal obstruction, which, in my opinion, is due to the varied surgical procedures done in the pelvic area. If the pelvic operations are excluded and the obstructions considered generally, the incidence of the condition is still about 50 per cent higher in women than in men.

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The time that elapsed between the operation and an acute bout of intestinal obstruction varied, depending on such factors as whether drainage was performed at the time of operation, whether an acute abdominal condition existed at the time of laparotomy, or whether elective surgical intervention had been employed.

TABLE 3.—*Intervals Between Operation and Obstruction*

Time Elapsed	No. of Cases		Percentage	Drainage	Acute Abdominal Disease	Elective
0 to 6 mo.	5	12	36.3	7	10	2
6 mo. to 1 yr.	7					
1 yr. to 3 yrs.	5	11	33.3	1	2	9
3 yrs. to 5 yrs.	6					
5 yrs. to 10 yrs.	4	7	21.2	3	3	4
10 yrs. to 15 yrs.	3					
15 yrs. to 20 yrs.	3		9.9	3	0	3

Twenty-two of the patients showed signs of chronic intestinal obstruction. On all of these, the operation had been performed a year or more prior to the acute episode of intestinal obstruction.

Chronic Intestinal Obstruction. — An analysis of the signs shown by patients with a history of chronic obstruction is in order here. Ordinarily the onset is slow and insidious. The symptoms are (a) disturbances of the intestinal contents due to its circulation and (b) repeated attacks of partial obstruction.

The onset may be abrupt, but the symptoms ordinarily disappear rapidly. The pain is always the same, spontaneous and coming on at a fixed point; then it radiates, owing to the exaggerated contractions of the intestine above the obstacle; arrest of gases; arrest of feces; slight abdominal distentions, and perhaps vomiting. This bout is variable in duration but is usually short, lasting up to forty-eight hours. The signs disappear with a large emission of feces.

The episodes repeat themselves at varied intervals, but become longer and more severe. Abdominal distention becomes more prominent with the contractions of the dilated loop, and the patient complains of a special sensation at the end of each contraction. "He feels the gases filtrating in the intestine, and the progressing gases calm the intestinal tenesmus." *At times,* on auscultation or even at a distance, a rumbling in the abdomen can be heard. The dilated loop is hypersonorous; there may even be a "clapotement" on percussion. The obstipation is prolonged between intermittent periods of diarrhea, and ulceration of the intestine will occur, resulting in tarry stools.

These episodes of obstruction undermine the general condition of the patient. The digestion becomes poor; the patient refuses to eat because it brings on pain. Chronic toxicity occurs, indicated by headaches and vertigo.

Acute Intestinal Obstruction. — The evolution of complete obstruction in a patient with acute obstruction is as follows: The first symptom is an excruciating pain anywhere in the abdomen, accompanied or followed by vomiting. The abdomen remains flat during the first hours, at first becomes distended at a fixed point, and then generally, with absolute stoppage of flatus and feces. The general condition of the patient changes rapidly; the facies is altered; the pulse becomes rapid and thready. The temperature, often subnormal, shows erratic oscillations; respiration is rapid and difficult; the output of urine decreases; the patient becomes cold and clammy, and death will inevitably occur within three to eight days unless an operation is performed. Unfortunately this is too often done too late.

With this general picture in mind, each symptom may be studied separately.

1. *Pain:* At the onset the pain is generally localized and corresponds to the site of obstruction. It radiates to the umbilicus by repercussion to the solar plexus, after which it becomes generalized in all parts of the abdomen. At the beginning the pain is intermittent and of short duration, occurs in the form of cramps and is awakened by the contraction of the intestine. This pain is colicky. Usually it becomes more severe with recurrence. Between cramps there is no dis-

comfort whatsoever. If the patient is a mother, she remarks that the cramps are similar to labor pains.

The abdomens of all patients with colicky pains should be auscultated by the examining physician or surgeon. It often seemed to all the colleagues on the service that many physicians or surgeons forget to examine the abdomen with the stethoscope.

2. *Borborygmus:* The occurrence of rhythmic cramps like colicky pains of short duration, with accentuation of borborygmus at the height of the pain, establishes the cramps as intestinal colic.

In the early stage of the obstruction the cramps are frequent and strong, but as the intestine becomes dilated they become rarer and weaker, and permanent discomfort is noticed.

3. *Vomiting:* Vomiting is an early symptom if the small bowel is involved—the higher the obstruction the more quickly it occurs and the more profuse is the vomitus. Obstruction of the lower part of the ileum, however, is associated with delayed vomiting.

The vomitus is alimentary, bilious and then fecaloid; when it becomes fecaloid, the condition of the patient is critical and the obstruction always involves the small bowel. Obstruction of the large bowel causes vomiting only exceptionally, and when it occurs it is reflex. Diagnosis is made on the basis of excessive abdominal distention.

4. In general, no gas and no feces are emitted, but the distal segment of the obstructed bowel can eject its contents either spontaneously or as a result of small enemas. These fecaloid emissions are associated with high obstruction of the small intestine. The obstruction quickly becomes absolute.

Physical Examination.—Inspection: At the early stage the abdominal distention is unnoticeable unless the patient is very thin.

Laugier described two classic varieties of distention: (a) periumbilical distention, with the abdomen globular and protruding forward, with depressed flanks, which indicates obstruction of the small intestine, and (b) distention "en cadre", on the sides, at the epigastrium; this is a sign of colonic obstruction or of obstruction low in the ileum.

The intestinal occlusion always starts at the loop proximal to the obstructed area (von Wahl). It is shown by an asymmetric abdomen. On palpation there are slight rigidity and tenderness of the abdominal wall.

Percussion: The abdomen is hypersonorous, at the onset specifically limited. At times, when distention is caused by liquids, there is absolute dulness, with a pseudoimpression of "flot" as in ascites.

Auscultation: At the height of the pain there is accentuation of sound (borborygmus), and, as the obstruction progresses, rumblings become audible.

Auscultation and Percussion Combined: A clear tympanic sound (Balloon sign of Nothnagel) or a drome resonance of light skin friction (Rumberg) may be noted. In other cases there are musical sounds and a metallic tinkling (Bayley).

Either this localized dilatation is immobile or it presents peristaltic movements that are visible and tangible. These intestinal contractions can be awakened by cutaneous stimulation of the abdominal wall and will cause severe pains. "Who says intestinal hyperperistaltism says obstruction" (Gruinard). After a time the intestine above this primarily meteorized loop dilates and contracts itself in order to overcome the obstacle, and it may form a mobile loop, visible with contractions, ending at the site of strangulation. Then all the intestine above the obstacle becomes dilated.

The abdomen is enormous and uniformly distended. The temperature is seldom much disturbed; in general, it is normal or low even in the late stages, though it may rise slightly in the presence of peritoneal irritation due to devitalization of the affected loop.

The pulse at the onset is slightly altered in rate and volume, and, as the period

of obstruction increases, it becomes rapid and thready. The output of urine decreases in proportion to the height of the obstruction, and albumen is always present.

Roentgen Signs: Roentgen examination was performed in this series unless the diagnosis and the cause were clear from the clinical signs. The scout films revealed a ladder-like arrangement of gas-filled coils of small intestine. In cases of obstruction of several days' duration the ratio between the gas and the fluid increased; with the patient in the upright position the films show definite fluid levels in the distended loops of bowel.

In considering the physical signs one cannot omit Leon Binet's humoral syndrome of intestinal obstruction, characterised by:

1. Blood concentration, which occurs a few hours after the onset of obstruction. The white blood cell count increases up to 12,000 or 14,000 per cubic millimeter, and a few days later there is a concentration of erythrocytes, with an increased hemoglobin level.
2. The hyperviscosity of the blood is due to the loss of water and is also caused by the intense hyperfibirinemia described by Hadden-Orr.
3. The carbon dioxide combining power rises with the level of the obstruction: the higher the obstruction, the higher the value becomes McCallum and McCann).
4. Hyperglycemia is present (Hadden and Orr; Rathery and Binet).
5. Hyperazotemia (Whipple) may be present, with values six or seven times higher than the normal value, and (Hadden and Orr) it may become proportional to the decrease of circulating chlorides.
6. Decreased chlorides are observed (Hadden and Orr; Gosset; Binet; Petit; Dutaillis).

In only a few cases of this series, however, was the carbon dioxide combining power raised or hyperazotemia present, and a decrease in chlorides occurred in only a few. In 2 of these obstruction was present for at least six to eight days, and in a few others there were obstructions high in the jejunum.

Early Diagnosis.—The diagnosis can be established early by the following cardinal signs:

1. A careful subjective history will show that the patient has undergone surgical treatment prior to the episode in question. The patient will also describe obstipation followed by bouts of diarrhea, with other signs characteristic of chronic intestinal obstruction.
2. Colicky pain in the median area is usually the first symptom. There may be, in addition, a localized pain referred to the position of the strangulated loop. The colic occurs in waves and gradually passes off; in the intervals between episodes of colic the patient may be free of discomfort. Borborygmi, metallic explosions of shifting gases or the bubbling and gurgling of mixed gas and fluid may be heard.
3. The high leukocyte count, although not always a permanent sign, was present in 80 per cent of cases in this series.
4. Roentgen examination is of value in this regard: Normally gas is not detectable in the scout film; the bowel contains gas, but its gaseous content is so fragmented that it does not show clearly in the film; the colon may normally present a roentgenographically visible content of gas, and this content may or may not be present below the obstruction.

If the small intestinal loops are seen to be distended with gas, there is a strong probability that there is an obstruction; but if, in addition, the colon is empty of gas, or if after a diagnostic enema the colon is shown to have emptied, while small coils of intestine are still gas-distended, the probability becomes a certainty.

When gases remain in the colon after

the diagnostic enema, colonic obstruction is present.

Incomplete obstruction gives less positive roentgen signs, because gas can be seen above and below the site of obstruction; and in the presence of partial obstruction of the ileum, not only are the small loops of intestine distended by gas but it can be seen roentgenographically in the colon also, and after the colonic enema the gas evacuated is replaced, again from above.

The mortality rate for this series of patients was 6 per cent. Of the 2 deaths that occurred, one was due to massive pulmonary emboli on the eighteenth postoperative day and the other to the fact that at the time of operation the patient's condition was so poor that only an enterostomy was performed; the patient died of starvation and dehydration in spite of parenteral and nutritional complementary measures.

Delayed Diagnosis: The items that cause delay in diagnosis of intestinal obstruction may be classified as (a) errors of the patient and (b) errors of the examining physician.

(A) Errors of the Patient:

1. The patient, not being ill between the abdominal colicky pains, does not think it necessary to consult a physician until vomiting has established itself.
2. The patient, if he notices slight distention, will seek relief by enema, have a bowel movement, feel improved and forget the matter until the next attack.

(B) Errors of the examining physician:

1. The patient does not look particularly ill; there are few physical pathologic signs or none. The colicky pains disappear at the time of examination. The physician assumes that the trouble was not serious.
2. Opiates are given, and on examination there are no cramps. This leads to a false impression that all is "within normal limits."
3. A complete past history, especially since the onset of the acute episode, is not taken.
4. Auscultation of the abdomen, which, if done, will reveal unusual sounds in the abdomen, is neglected.
5. The taking of a roentgen scout film is delayed.

Therapy.—All patients admitted with a diganosis of intestinal obstruction were treated by gastroduodenal suction with appropriate tubes. Intravenous fluids were given, and operative correction was performed when necessary.

The gastroduodenal suction established and the requirements of salt and water estimated, the intravenous fluids were administered in sufficient quantity and proportion to correct the deficiency in fluid balance. This treatment was followed for twenty-four to forty-eight hours. If, however, during this conservative treatment, (1) the pain persisted after hours of effective gastroduodenal suction, (2) the pain disappeared but reappeared during the treatment, (3) the distention failed to subside in spite of the effective drainage or because the intestine could not be intubated, or (4) rebound tenderness was present on admission, operative correction was performed.

In this series 3 patients were relieved by the conservative treatment, but 2 were subjected to operation when readmitted later with another bout of intestinal obstruction.

Laparotomy revealed that 25 per cent of the patients had adhesions of bowel to other loops of bowel; 25 per cent had adhesions to the abdominal peritoneum, and 50 per cent had constricting bands, most of them in the pelvic area.

Eight patients were treated by intestinal resection because of volvulus of the bowel around the adhesive band with necrosis of the intestinal loop. Two of these patients died—one eighteen days after the operation, owing to pulmonary emboli, and the other of starvation and dehydration, because, the condition of the patient at the time of operation not permitting the performance of more than an esterostomy.

SUMMARY AND CONCLUSIONS

1. Postoperative intestinal obstruction is *not* a rare syndrome.
2. There are *evident* signs to direct the surgeon to an early diagnosis.
3. The treatment can be established *early*, and prompt, accurate operative intervention can be accomplished.
4. The condition has a high mortality rate, but this can be diminished if diagnosis and the treatment are established early.

RESUMEN

1. La obstrucción intestinal postoperatoria no es un síndrome raro.
2. Existen signos evidentes para orientar a un diagnóstico temprano.
3. El tratamiento puede establecerse oportunamente y operarse temprano en forma apropriada.
4. Existe un alto índice de mortalidad, pero puede disminuirse si el diagnóstico y el tratamiento tienen lugar oportunamente.

ZUSAMMENFASSUNG UND SCHLUSSFOLGERUNGEN

1. Das Syndrom des postoperativen Darmverschlusses ist keine Seltenheit.
2. Es gibt deutliche Zeichen, die den Chirurgen zu einer fruehzeitigen Erkennung dieses Krankheitszustandes fuehren koennen.
3. Die Behandlung kann fruehzeitig eingeleitet und ein sofortiger exakter chirurgischer Eingriff ausgefuehrt werden.
4. Die Sterblichkeitsquote der Erkrankung ist hoch, koennte aber durch fruehzeitige Diagnose und Einleitung der Behandlung verringert werden.

SUMÁRIO E CONCLUSÕES

1. A obstração intestinal posoperatória não é uma sindrôme rara;
2. O cirurgião pode sêr orientado para um diagnostico precoce por sinais evidentes;
3. O tratamento deve sêr estabelecido precoce e prontamente;
4. A complicação traz um indice de mortalidade alto, o qual poderá sêr diminuido se o diagnostico e o tratamento fôrem estabelicidos precocemente.

RÉSUMÉ

1. L'obstruction intestinale post-opératoire est fréquente.
2. Le diagnostic précoce peut se faire facilement.
3. Si le traitement est prompts et précoce l'intervention sera heureuse.
4. Cette complication présente un taux de mortalité élévée; cependant, le diagnostic et le traitement précoces pourraient la faire baisser.

Foreign Interns and Residents Available

Approved hospitals in the United States and Canada having openings for interns and residents are requested to communicate with the Secretariat of the International College of Surgeons, 1516 Lake Shore Drive, Chicago 10, Illinois.

Interrelation Between Hepatic Lesions and Lesions of the Biliary Tract

HANS POPPER, M.D., PH.D., F.A.C.P.
CHICAGO

IT is well known to all surgeons that lesions of the biliary tract have a profound effect upon the liver, and it is almost as well appreciated that diseases of the liver lead to functional and structural abnormalities of the biliary tract. In the last decade pathologic and physiologic knowledge of the liver has made great progress owing to (a) the widened use of liver biopsy, (b) better understanding of liver function, and (c) improved methods of producing experimental hepatic injury. Similarly, various roentgenologic procedures and physiologic technics have widened professional knowledge of disease of the biliary tract. This knowledge, newly acquired in the past few years, invites a review of the interrelation between hepatic lesions and lesions of the biliary tract and its application to bedside procedure.

The effect of the biliary tract upon the liver makes itself felt mainly in two ways, by alteration of bile flow (especially obstruction) and by inflammation. Interference with the bile flow, reflected in jaundice, is the most significant clinical manifestation of biliary obstruction. In the clearly defined extrahepatic variety the obstruction may be located anywhere from the papilla of Vater to the bifurcation of the main hepatic duct. It should be stressed that obstruction of only one branch of the hepatic duct is not followed by jaundice, because the unobstructed part of the liver will easily excrete the bilirubin that piles up in the obstructed part.

Several causes of extrahepatic obstruction are well known. It may be due to stones in the common and the hepatic duct and also in the terminal portion of the cystic duct, with bulging forward into the common duct. It is often produced by tumors, usually of the malignant type, which occur either within the ducts themselves or in the surrounding structures, such as the pancreas and the lymph nodes. Lymph node enlargement alone does not obstruct the duct if it is not fixed to the nodes or to the pancreas; this means that carcinomatous infiltration of its wall is required.[1] This explains why leukemic or inflammatory enlargement of the portal lymph nodes does not cause obstructive jaundice. Furthermore, inflammatory strictures, most of them occurring after surgical treatment of the gallbladder and common duct and sometimes resulting from decubital ulcers produced by an impacted stone, may cause obstruction. The structure[2] and the function[3] of the sphincter of Oddi at the papilla of Vater have recently received much attention. Various authors in France[4] and Germany[5] have considered spasm of this sphincter, possibly caused by duodenitis, as a cause of jaundice. The possibility of such sphinteric spasm has been demonstrated by peritoneoscopic cholangiographic study.[6] It may be the cause of impressive clinical manifestations of biliary dyskinesia[3] which may even call for surgical sphincterotomy.[7] Nevertheless the evidence that jaundice may be due to spasm of the sphincter of Oddi is still not convincing. A series of rarer causes of extrahepatic biliary obstruction include congenital malformations, such as atresia or hypoplasia

From the Hektoen Institute for Medical Research of Cook County Hospital and the Departments of Pathology of Cook County Hospital and Northwestern University Medical School, Chicago, Illinois.
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of the ductal system in infants and choledochal cysts in the adult,[8] inflammatory and cystic lesions in the pancreas, duodenal inflammations and diverticula, parasites and even periductal cellulitis following cholecystectomy.[9]

The similarity in clinical and laboratory observations between intrahepatic biliary obstruction[10] and the extrahepatic variety invites some discussion of this form, which only recently has met with widened acceptance. Diffuse alterations of the smallest bile ducts or cholangioles in the portal fields as well as within the parenchyma of the liver are assumed to interfere with the bile flow just as an extrahepatic mechanical obstruction does. Histologically there is no liver damage. In the acute stages the picture is not specific, and in later stages proliferation of the cholangioles surrounded by inflammatory exudate and followed by fibrosis is noted[11] (Fig. 1). This cholangiolitic hepatitis[12] with the clinical and laboratory pictures of an extrahepatic biliary obstruction presents an important differential diagnostic problem, since surgical procedures (such as drainage of the biliary tract) may even have a deleterious effect. If, therefore, at the time of exploration when the signs of an extrahepatic obstruction have been observed, a narrow common duct and hepatic duct are noted, further surgical management of the bile ducts should be omitted. Either cholangiolitic hepatitis or a carcinoma at the bifurcation of the common hepatic duct within the liver is present; neither condition is benefited by such procedures.

The effects of extrahepatic biliary obstruction upon the liver depend on duration and degree of the obstruction, being more marked in the complete type. Complete biliary obstruction is most common with tumors in which a tube with an infiltrated wall is progressively narrowed. When complete the obstruction is not spontaneously relieved, with the widely cited but rare exception of the sloughing of a tumor of the papilla of Vater. In contrast, calculous obstruction is first complete because of the associated initial spasm and edema of the duct wall. Subsequently these phenomena subside and the duct dilates in response to the obstruction. At least partial bile flow is reestablished until the stone lodges itself once more in a completely obstructing position. A ball-valve effect results in incomplete or intermittent obstruction. Similarly, strictures more commonly produce incomplete and sometimes intermittent obstruction.

The effect of the obstruction upon the liver can be looked upon from the points of view of histology, the results of the hepatic tests and the clinical picture. Histologically,[13] changes appear within the first week of complete obstruction, characterized by centrolobular bile stasis with bile plugs in bile capillaries and by slight liver cell damage. Subsequently the liver cells show a characteristic "feathery" degeneration around dilated bile capillaries, which may rupture (bile lakes). Furthermore, circular fibrosis and bile duct proliferation in the portal triads ensues. After several weeks bile ducts in the portal fields may rupture, resulting in bile extravasates surrounded by foreign body reaction (Fig. 2*A*); in addition, circumscribed necrosis of liver cells on the lobular periphery develops preceded by rarification of the cytoplasm (bile infarct,[14] Fig. 2*B*). The latter two changes occur only in the presence of extrahepatic biliary obstruction and are therefore diagnostically significant. Finally, after more than six weeks, in necropsy specimens diffuse degeneration of the liver cells is combined with very severe bile stasis. In incomplete obstruction these changes develop at a slower speed but may eventually lead to biliary cirrhosis. The important point which the biopsy has taught us is that liver cell damage may occur relatively early in obstruction.

The biochemical findings reflect the histologic changes. The bile stasis[15] leads to marked elevation of serum bilirubin and excretion of bilirubin in the urine and to moderate and sometimes marked elevation of the total serum cholesterol, partly due to interference with biliary excretion of cholesterol and partly due to its exces-

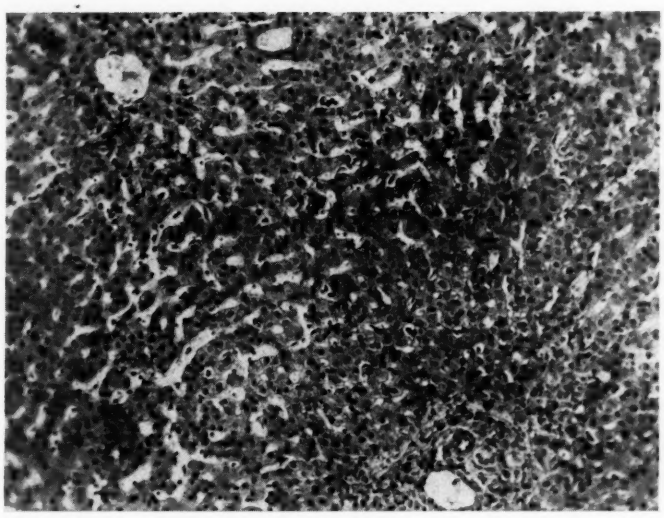

Fig. 1.—Biopsy specimen of liver in a case of subacute "cholangiolitic" hepatitis. Hardly any liver cell damage is present, and little cellular infiltration is seen in the portal triads. The hepatic tests reveal evidence of severe bile stasis but little liver damage. ×90.

sive formation in the presence of bile stasis. Also the serum alkaline phosphatase activity rises markedly again owing either to faulty biliary excretion of enzymes formed outside of the liver or to excessive formation in the liver in the presence of bile stasis. Urinary urobilinogen is derived from intestinal transformation of bilirubin with subsequent reabsorption into the blood stream; it is absent in complete biliary obstruction but reveals spiking levels in incomplete obstruction. The liver cell damage is reflected in abnormal results of several tests, for instance, low choline esterase[16] and low cholesterol ester ratio,[17] both due to a degeneration of the liver cells, which are said to form cholinesterase and esterify cholesterol. The reduction of the cholesterol ester ratio is especially helpful in evaluating the status of the liver in patients with biliary obstruction. The flocculation tests usually give negative results despite the liver cell damage, because other factors interfere (e.g., gamma globulins are not elevated and a factor depressing the flocculation is present in the blood). In general, in uncomplicated biliary obstruction, the tests for bile stasis are abnormal to a higher degree and with greater frequency than those for liver cell degeneration in contrast to the medical types of jaundice.[18]

The hepatic damage is also reflected in clinical manifestations. The pruritis seems to be due to retention of bile acids. In the earlier stages the hepatic insufficiency is mainly reflected in general malaise and anorexia, and as the process progresses all other signs of hepatic insufficiency, such as fetor hepaticus, central nervous manifestations and coma, may appear as evidence of a breakdown of hepatic function characterized by such terms as cholemia or hepatic coma.

Cholecystectomy and biliary fistulas which alter bile flow without biliary obstruction may cause changes in the liver. Experimentally in dogs, internal or external biliary fistulas were shown to produce impairment of hepatic function as indicated by bromsulfalein retention and phosphatase elevation;[19] a similar but milder effect was produced by cholecystectomy;[20] this effect is only temporary in man[21] if it exists at all. These changes after chole-

cystectomy or biliary fistulas are probably related to dilatation of the biliary tree with pressure effects upon the liver as explained by Ivy and his co-workers.[19] After removal of the gallbladder[22] the sphincter of Oddi relaxes for about six months, which results in constant oozing of bile into the duodenum. At the same time the duodenal pressure produces dilatation of the biliary tract. Similar pressure effects follow cholecystoduodenostomy[23] or implantation of the common duct into the intestine.[24] Pressure in bile fistulas, however, exerts probably less important influences upon the liver than do other factors. In external fistulas the loss of bile may interfere with fat absorption, thus predisposing to malnutrition. More important sequelae are inflammatory lesions of the biliary tract, which are more commonly associated with spontaneous fistulas than with surgical ones.

Inflammation of the biliary tract may influence the liver by several means. It may produce an obstruction of the biliary tree, either in its smallest branches, due to mucopurulent material, or in the larger branches by scarring (stricture). Bacteria or toxins may be released which reach the liver through ascension in the biliary tree or by hematogenous routes. Suppurative extrahepatic or intrahepatic cholangitis without preceding involvement of other parts of the biliary tract is unusual. Hematogenous infection occurs rarely from various infectious foci in the body (e.g., appendicitis) and is usually due to salmonella, Friedlander's or colon bacilli or cocci;[25] in the older literature chronic cholangitis lenta was occasionally mentioned. Most examples of suppurative cholangitis are secondary to fistulas, obstructive lesions of the biliary tree (especially if incomplete), cholecystitis, and

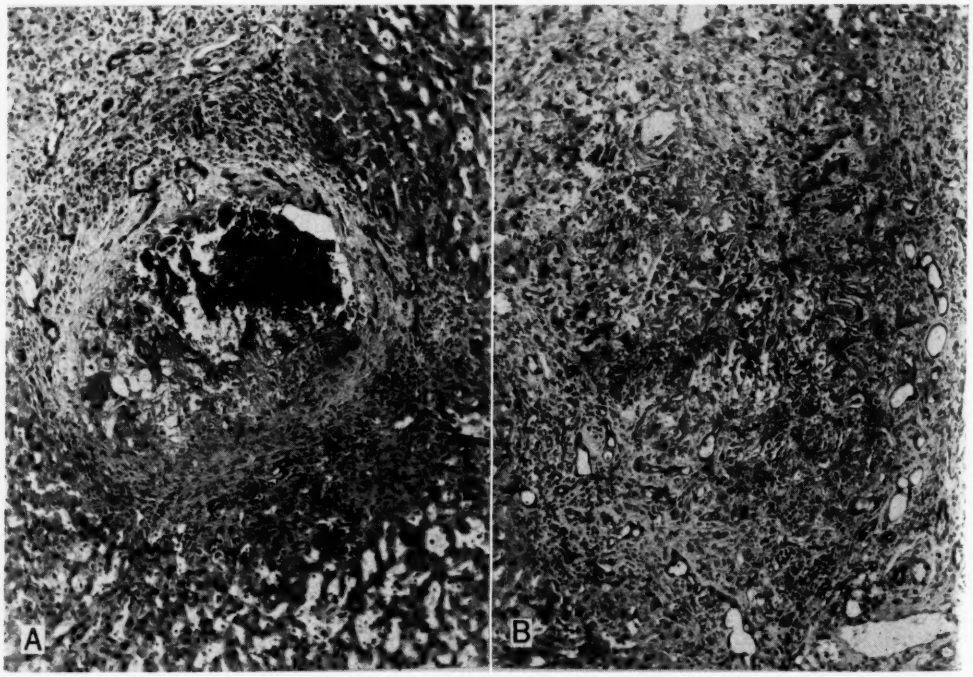

Fig. 2.—Biopsy specimen of liver of patient with prolonged extrahepatic biliary obstruction due to carcinoma of the pancreas. ×78. *A*, extravasate of bile from a bile duct in the portal triad surrounded by connective tissue reaction; *B*, "bile infarct" with necrosis of the liver cells, which reveal a rarified brown pigmented cytoplasm.

occasionally surgical trauma or descending infections from liver abscesses, pylephlebitic or cholangitic in origin. Stasis is an important factor in the propagation of the cholangitic infection into the liver; nevertheless, many infections of the biliary tree are actually descending, following the direction of the bile flow. This is evidenced by their common occurrence in the absence of any biliary obstruction. Injurious agents, such as bacteria and toxins, enter the portal circulation from foci in the biliary tract (as well as from the intestine). If they reach the hepatic capillaries, the sinusoids, they may either be taken up by the Kupffer cells or pass through the sinusoidal wall into the tissue spaces. Here they are either taken up by the liver cells and possibly transmitted into the bile or they are drained to the lymphatics in the central fields, or, more commonly, in the portal canals. A perilymphangitic inflammation develops, sometimes encroaching upon the neighboring bile ducts[26a] and occasionally developing into a suppurative process. Old experimental studies with intraportal bacterial injection support this concept.[26b] A number of bacteria may be responsible for the cholangitic or hematogenous lesion; the most common offender is probably Bacillus coli, followed by streptococci (including Streptococcus faecalis), Aerobacter aerogenes and Bacillus proteus.[27] The type of organism is important from the point of view of antibiotic treatment and is also said to influence the route of the bacteria.[28]

Histologically inflammatory infiltration, more often around lymphatics (or around the neighboring bile ducts) than within the bile ducts, is noted (Fig. 3*A*). In the acute stages many segmented leukocytes are seen. Such perilymphangitic inflammations are extremely common, even in normal persons[29] or in general autopsy material.[30] They are probably a reflection of common and minor intestinal infections. Their presence in cases of cholecystitis therefore does not necessarily prove that they are due to this disease, as has been assumed by Graham and others.[31] Only severe perilymphangitic inflammations are of clinical significance, especially if they involve every portal triad and if they progress to abscesses (Fig. 3*B*). In these instances liver cell degeneration is noted. This is particularly significant if biliary obstruction is complicated by infection, such as cholangitis or cholecystitis, or in the presence of diabetes. Under these circumstances the liver cell damage depends not only upon the degree and duration of the obstruction, but more on the degree of inflammation, and it occurs much earlier after the onset of jaundice. However, it should be stressed that in the presence of gallbladder disease without jaundice significant liver damage may be present.[32] Chronic biliary infection, usually but not always associated with jaundice, causes fibrotic transformation of the cellular exudate in the portal triad, with subsequent scar formation. The fibrosis is not restricted to the portal triads but sends finger-like extensions into the lobular parenchyma (Fig. 3*C*). This stage of cholangitic cirrhosis is not associated with portal hypertension, and some do not call it cirrhosis. In late stages fibrotic septums subdivide the liver lobules. This results in pictures which clinically and anatomically do not differ from that of the common type of cirrhosis and are associated with ascites, splenomegaly and esophageal varices.

The laboratory data indicative of infection of the biliary tract are characterized by two features. The first is the presence of signs of inflammation in general, such as leukocytosis, an elevated sedimentation rate, or a marked elevation of serum gamma globulins.[33] The last-mentioned change renders the flocculation test results abnormal in the presence of infected biliary obstruction, although other accompanying conditions, such as obstruction, favor their being normal. The second feature is abnormal results from the tests indicating liver cell damage[15] (or increased abnormality if it was present before, e.g., due to biliary obstruction). This concerns the cholesterol ester ratio,

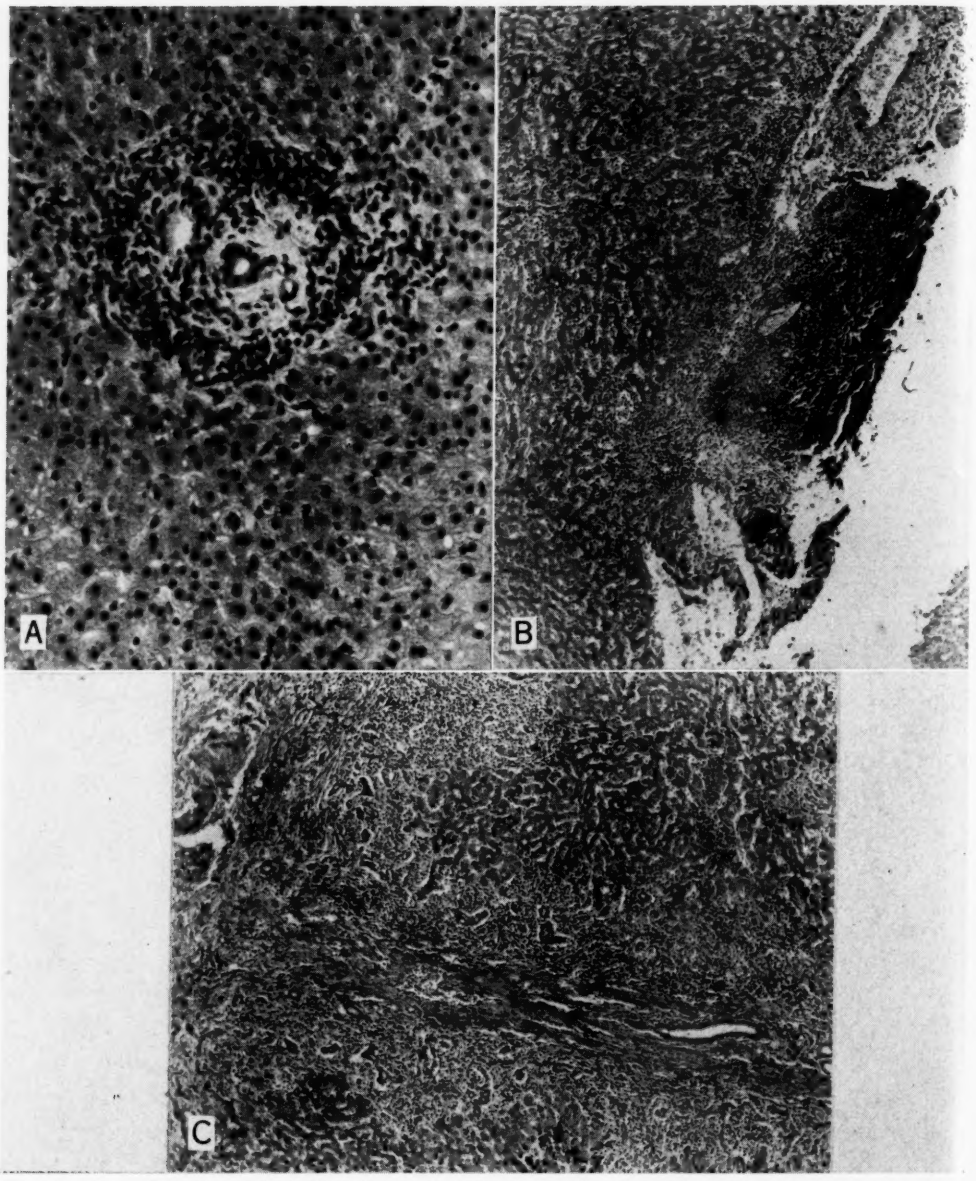

Fig. 3.—*A*, perilymphangitic infiltration composed of round cells and segmented leukocytes in a portal triad in a patient with cholecystitis. ×190. *B*, purulent perilymphangitis in the portal triad of a patient with incomplete biliary obstruction due to choledocholithiasis. ×45. *C*, cholangitic cirrhosis in a patient with stricture of the common duct. Finger-like extensions of the periportal tissue containing proliferated bile duct and inflammatory exudate extend into the lobular parenchyma. ×39.

for instance. In general, a bacterial infection transforms the laboratory data of "surgical" type of obstructive jaundice into those of a "medical" type of jaundice. In the presence of chills, high fever and leukocytosis, laboratory data suggestive

of a "medical type of hepatitis or cirrhosis can therefore be due to a "surgical" type of jaundice.

Clinical manifestations of inflammation of the biliary tract include enlargement and tenderness of the liver. These signs may be transient in a case of intrahepatic cholangitis, parallel with marked leukocytosis depending upon a temporary intrahepatic biliary obstruction by purulent exudate.

The effects of the liver upon the biliary tract are less conspicuous but also important. They may make themselves felt in the major diseases of the biliary tract. Disorders of the motor function of the biliary tract, the so-called dyskinesias[34] may be influenced by diseases of the liver. Hypomotility with stasis in the gallbladder occurs in association with diseases of the liver and may persist for considerable time in convalescence after viral hepatitis.[35] Disturbances of the bile flow influencing the contraction of the gallbladder also occur in cases of hepatic disease. Whether spasm of the sphincter of Oddi (hypermotility dyskinesia) may be produced by hepatic disorders remains to be established.

Gallstone formation is at present explained by (1) stasis (e.g., resulting from dyskinesia); (2) altered constitution of the bile, and (3) inflammation. Hepatic dysfunction may thus cause stone formation in the gallbladder either by disturbances of the bile flow or by alteration of the bile.[36] Its cholesterol content may be increased in the presence of hepatic disease, or, even more important, there may be a reduction of concentration of the bile acids[37] or fatty acids[38] which keep cholesterol in solution in the bile. Possibly changes in the reaction of the bile facilitates stone formation.[39] Statistical evidence is not conclusive, but suggests a significant incidence of gallstones in patients with disease of the liver.

The pathogenesis of acute cholecystitis is today problematic. The older concept considered acute cholecystitis the result of bacterial invasion. Now it is realized that, in a significant number of instances of acute cholecystitis, bacteria play no etiologic role and a chemical injury is responsible; either the bile itself[34b] or, less probably, the reflux of pancreatic juice into the biliary tract[40] produces the inflammation. Experimental evidence (e.g., the chronic inflammation resulting from prolonged obstruction of the cystic duct in dogs[41]) or histologic evidence (such as the demonstration of inflammatory reaction around intramural bile in the presence of so-called cholesterolosis[39c] clearly favor the toxic effect of bile itself, possibly due to the presence of abnormal bile acids. Hepatic dysfunction may thus be related to acute cholecystitis. Later, bacteria infect the acute lesion[42] and become responsible for chronic cholecystitis. The lymphatics of the gallbladder are in direct communication with those of the liver.[43] Graham[31] assumed that, along those channels, hepatitis may infect the gallbladder, thus becoming the cause of cholecystitis. The perilymphangitis observed by him and others in association with cholecystitis, however, as has been pointed out, is not significant and specific enough to support this type of relation between diseases of the liver and diseases of the biliary tract. Severe hepatic edema, as it occurs in many types of infections or intoxications, through the lymphatic connection may cause edema of the gallbladder bed, which may account for tenderness in the gallbladder region in a patient with hepatic disease, without involvement of the gallbladder wall itself.[44]

The cause of carcinoma of the biliary tract is as little established as that of tumors in other locations. Bile acids are chemically related to carcinogenic substances and are possibly carcinogens.[45] Also, extracts of human bile are possibly carcinogenic.[45a] Therefore, carcinoma of the gallbladder and bile ducts may be related to hepatic dysfunction.

CONCLUSION

In conclusion, the relations between the gallbladder and the biliary tract are complex, but of great significance in

medical and surgical management. As knowledge of the physiology and pathology of the liver increases in a steep curve, some of these relations may become easily understandable, and others, previously not recognized, may complicate our thoughts. For considerable time this problem has been a challenge to the surgeon, the internist and the pathologist. It is safe to predict that this challenge will remain with us for many years to come.

CONCLUSIONES

As relações entre a vesicula biliar e os canais biliares são complexas e da mais alta significação no tratamento médico-cirúrgico. Com o conhecimento da fisiopatologia do figado aumentam em curva pronunciada, e, algumas relações devem sêr facilmente identificaveis, e outras precocemente reconhecidas, caso contrario ficarão mais complicados ainda os nossos pensamentos sôbre o caso.

Durante muito tempo êsse problema foi um constante defasio ao cirurgião, ao internista e ao patologista. E, de nossa parte, conclue o autôr, estamos certos de que êsse desafio persistira ainda por muitos anos.

RÉSUMÉ

Les rapports entre la vésicule biliaire et les canaux sont complexes mais très importants pour établir le traitement médical ou chirurgical. Les connaissances de la physiologie et de l'anatomie pathologique du foie sont à la hausse. Cependant, malgré des connaissances plus vastes, il existe encore une foule de problèmes qui ne seront résolus que plus tard.

CONCLUSIONI

I rapporti fra colecisti e vie biliari sono complessi, ma di grande importanza per la cura medica e chirurgica. Poichè le nozioni sulla fisiologia e patologia del fegato aumentano rapidamente, alcune di queste relaziono possono divenire facilmente comprensibili, e altre—prima non conosciute—possono complicare le nostre idee. Per lungo tempo questo problema è rimasto una sfida per il chirurgo, l'internista e il patologo. E' facile prevedere che tale resterà per molti anni a venire.

RESUMEN

Las relaciones entre el colecisto y las vías biliares son complejas, pero de gran significación en la atención médica y quirúrgica. Como el conocimiento de la fisiología y la patología del hígado aumentan en forma vertiginosa, algunas de estas relaciones pueden ser difícilmente entendidas y otras, no reconocidas previamente, pueden complicar nuestros juicios. Este problema ha sido por mucho tiempo una preocupación para el cirujano, el internoista y el patólogo. Puede predecirse con seguridad que esta preocupación persistirá por muchos años.

ZUSAMMENFASSUNG

Die Beziehungen zwischen der Gallenblase und dem Gallengangssystem sind verwickelt, spielen aber in der medizinischen und chirurgischen Therapie eine grosse Rolle. Die Kenntnisse von der Physiologie und Pathologie der Leber wachsen in raschem Masse. Zur gleichen Zeit werden uns manche Beziehungen leicht verstaendlich, waehrend andere, die wir frueher nicht kannten, unsere Vorstellungen komplizieren. Seit geraumer Zeit hat dieses Problem den Chirurgen, den Internisten und den Pathologen beschaeftigt, und man kann mit Sicherheit voraussagen, dass das noch fuer eine ganze Reihe von Jahren so bleiben wird.

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Why the Infrequency of Malignant Duodenal Disease?

ANDRE B. CARNEY, M.D., F.A.C.S., F.I.C.S.
TULSA, OKLAHOMA

CHARACTERIZATION and evaluation of the processes through which the various enzymes, hormones and duodenal juices function is not yet available. I entertain no chimerical hopes that this contribution will supply any conclusive evidence and I shall make no attempt to predict the source from which the solution of this vexing problem will eventually come. It is not likely that the problem is impossible of solution, but one must keep ever in mind the immense amount of investigative study now being pursued by alert clinical medical research, by thousands of well-trained pathologists and by scores of scientific laboratories throughout this and other countries. These men have considered hundreds or, more probably, thousands of possibilities. The search for truth goes on, and, although the goal may not be just around the corner, it cannot be too far away. When reviewing the literature relative to this subject, there are times when one is scorched with lightning of momentary imagination, not a product of dreaming indolence but the hope that the solution of this problem can and may lead to others of equal or greater magnitude.

The complexity and seriousness of the problems associated with carcinoma have led to so much theorizing that Roux years ago justifiably labeled cancer as one of the last outposts of metaphysics in medical research. The pathologist, the internist, the research scientist, the chemist and the biochemist, are all concerned, and the medical or surgical practitioner is greatly indebted to them. The statistics, the end results and the scientific publications resulting from their efforts are most valuable and helpful.

The relative infrequency of carcinoma or sarcoma of the duodenum is one of the unsolved mysteries of medicine. Why the pyloric ring should be the dividing line between malignant and nonmalignant disease has long vexed the minds of students of physiology and pathology. The only exact statement that can be made is that at the precise moment this question is still unanswered.

A review of the history of primary malignant tumor of the duodenum reveals that the first descriptive record of a "scirrhous" lesion was that given by Hamberger in 1746. The literature since that time has given sufficient evidence of the infrequent occurrence of this form of carcinoma.

It occurs in less than 0.01 per cent of cases in which postmortem examination is performed. Occasionally but infrequently the condition is diagnosed preoperatively. This disease, by virtue of its rarity, is both more interesting and more complex than are other forms, considering the frequency of carcinoma of the stomach and the general failure of this lesion to invade the mucosa of the duodenum. The high immunity of this segment of the alimentary tract distinguishes it from all other parts of the human body. The frequency with which inflammatory lesions occur in the duodenum and their tendency to persist, recur and cicatrize without undergoing malignant change or encouraging malignant invasion is conducive to much serious thought. Why, one asks oneself, do in-

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flammatory lesions of the pylorus appear as, or develop into, malignant tumors in such a high percentage of cases, while a lesion both macroscopically and microscopically the same, and less than half an inch away, has not the tendency or even the inclination toward malignant development? Why does the pylorus act as a natural barrier against invasion of cancer cells from the gastric mucosa? Is there an anticancer hormone in the walls of the duodenum that stops the invasion? Is there some substance liberated in the liver which, when mixed with duodenal enzymes and juices, prevents carcinomatous growth? Is there some enzyme or hormone coming from the pancreas which, when mixed with duodenal contents, prevents the formation or development of cancer cells? Does the admixture of bile with pancreatic and duodenal juices combine to prevent the formation of cancer cells?

From the reported cases of duodenal carcinoma, there is an evident predilection for occurrence in or near the ampulla of Vater. This could easily be attributed to invasion rather than to a primary lesion.

In general, the following statistics are basically correct and of interest both academically and practically: primary carcinoma of the liver occurs in approximately 5.1 per cent of all cases of carcinoma; primary carcinoma of the biliary ducts, in approximately 3.5 per cent, and primary carcinoma of the pancreas and pancreatic ducts, in approximately 3 per cent; primary carcinoma of the stomach, the most common of all malignant tumors, occurs in excess of 25 per cent of all cancer cases. Why, then, should the duodenum, the one part of the intestinal tract surrounded by organs so frequently involved and receiving their secretions, maintain so high a degree of immunity to malignant invasion?

Anatomic Considerations.—The duodenum starts at the pyloric ring of the stomach and follows an upward direction toward the gallbladder. It is completely covered with peritoneum except in the immediate first part of the first portion, which has no peritoneal covering on its posterior wall. This first portion is known as the duodenal bulb. The second or descending portion begins abruptly, being completely retroperitoneal as it descends between the hilus of the right kidney and the head of the pancreas. Into this important segment of the duodenum open the common biliary and pancreatic ducts. At approximately the level of the third lumbar vertebra the duodenum bends rather acutely to the left. The progress is slightly upward to a point on a level with the second lumbar vertebra. The third portion terminates at the point of crossing of the mesenteric vessels. The short fourth portion is that part beneath the mesenteric vessels, curving to the left of the vertebral column to the duodenojejunal juncture or the area of the ligament of Treitz.

The mucosal surface of the duodenum is increased by extensive circular folds and villi, these being more pronounced in the lower duodenum than in any other part of the small intestine.

It is apparent, therefore, that after such a circuitous route the duodenum offers as much obstruction to the passing of gastrointestinal contents as does any other segment of the gastrointestinal tract, if not more. This fact obviously excludes, therefore, one of the previously advanced theories that lack of obstruction with minimal irritation is a predisposing factor to the benignity of tumors occurring in this segment of the intestinal tract.

Physiologic Considerations.—The exact physiologic character of the duodenum is as yet undetermined. In general, it is known that as a part of the small intestine it has the power to produce chemical alterations in food substances and the ability to transform food particles into products that will be absorbed by the blood stream and later converted into energy for the metabolic requirements of the entire body. Digestion commences in

the duodenum and, theoretically at least, terminates in the distal portion of the ileum. The duodenum is not only capable of absorption from the mucosa but has certain definite secretory functions of great physiologic significance, and it is these secretory functions which have not yet been clearly defined. It is not too generally assumed by physiologists that the acid gastric juice, coming into contact with the duodenal mucosa, excites the formation of a hormone called prosecretin. This in turn, and through some chemical process as yet unknown, later becomes secretin. One of the few known actions of secretin, once it has been absorbed into the blood stream, is to initiate the flow of bile and pancreatic juices into the duodenum. Of any other function of secretin nothing is known. Is it possible that this is the inhibitory hormone that makes the duodenum so resistant to cancer?

Histologically the structure of the duodenum is similar to that of other parts of the small intestine, although entirely different from that of the stomach. The duodenum acts as a receptacle for material from the stomach, conducts the food over the many tiny villi lining its walls and assisting in transforming the food particles into body energy. The stomach and the duodenum differ materially in their makeup, not only their chemical and hormonal components but in their physical characteristics. The stomach is composed of mucosa, submucosa, three layers of muscle fibre, and serosa, whereas the duodenum is much thinner, having only one muscular layer. This physical disparity between the organs, however, should have no significance with regard to the occurrence of malignant diseases; therefore, one must seek elsewhere for the inhibitory factor. It is advisable, therefore, to examine the characteristic differences of these organs in cellular structure.

Microscopically the mucosa of the duodenum is divided into epithelial basement membrane, tunica propria and muscularis mucosa. Fungus-like villi in folds are abundant throughout the mucosa. These are covered by dense columnar epithelium. These same features, however, are characteristic of other parts of the small intestine, although there are other fundamental differences. The distinguishing factor in the duodenum, rendering it microscopically different from all the other segments of the small intestine, lies in the characteristically different Brünner's glands. These glands are branched tubular structures and are present in no other part of the body. As has been stated, they produce a secretion which, when mixed with duodenal contents from the gastric segment, produce an alkaline fluid, the further action of which is as yet undetermined. It is obvious that these glands do have some other function and that the hormone so liberated has yet to be fully explored. Its action, inhibitory or otherwise, must eventually be determined.

The essential secretions combined in the normal process of digestion as known at this time are (1) pancreatic juice, (2) bile with its various salts, some of which are still unknown, (3) succus entericus and (4) the duodenal hormone prosecretin. The duodenal hormone as has been noted, through some unknown process is converted into secretin. Through the action of this hormone in the blood stream there is initiated a flow of pancreatic and biliary juices in sufficient quantity for the immediate needs of the body.

At present, five basic theories as to the cause of cancer are generally advanced and seriously considered, and these apply equally to all forms of animal life; (1) trauma due to constant irritation; (2) embryonic defects; (3) biochemical factors; (4) infectious agents, and (5) genetic factors. Any or all of these five theories should apply as well to the duodenum as to any other part of the body. Why then, does such a strong tendency to benignity exist in tumors of this particular segment?

Considering each theory separately, it may be stated briefly, and in general, that (1) trauma from constant irritation

occurs at least as often in the duodenum as in any other part of the intestinal tract, and perhaps oftener; (2) there are, in general, as many embryonic defects in the duodenum as in any similar segment of the intestinal tract; (3) as for biochemical carcinogenic agents, there is no definitely known reason for suspecting the presence of a carcinogenic hormone in any given segment of the intestinal tract; (4) as for infectious agents, little is known as to the susceptibility of certain parts of the body to any organism still undefined; furtherfore, there is no reason to believe that the duodenum would be less exposed to such infection, should it exist, than would the adjacent segments of the intestinal canal, and (5) as for genetics, it is unlikely that this part of the body alone can be practically immune to inherited weaknesses.

It has been proven conclusively through the work of Leo Loeb and Lacassagne that certain tumors, under certain given circumstances, appear with regularity and are identical in cellular structure. Through the milk factor of Bittner, and genetic influence, certain obvious conclusions have been reached as to carcinoma of the breast, and this may eventually throw some light on the benignity of tumors of the duodenum, remote as this may seem. Of special interest at this time is the work of Hennaway and Cook of London who, as far back as 1930, demonstrated that pure dibenzanthracene 1,2,5, and 6 was the carcinogenic factor in tar. This observation was further developed by Hieger in identifying the carcinogenic tars as having a characteristic fluorescent spectrum that the others lacked. On this theory a group of well over 500 carcinogenic agents have been described, many of which bear no close chemical interrelationship. In working with these agents it was found that 20 methylcholanthrene tends to produce malignant change in a high percentage of instances and with a latent period of weeks only. This was of great interest, owing to the fact that the compound was synthesized from bile acids after prolonged and complicated chemical procedures. Though it is thought that the production of this substance in the animal organism is unlikely, nothing definite is known. The amount necessary for the production of malignant change is very small, but it is not going too far afield to suggest that the neutralizing agent or hormone for this or some other carcinogenic factor may lie in the substance of Brünner's glands, for it is in this part of the body alone that there is reason to believe that an inhibitory factor does exist.

Of particular interest is the extensive work of Maud Slye. Her many publications from 1914-1937 dealt particularly with the recessiveness of tumor inhibition. She was the first to propose the theory of a single recessive factor. Little, Lynch and others carried this research still further in the experimental field, and much of value is now of record as a result of this splendid work. By the careful inbreeding of mice it has determined that this practice, though it does not influence the development of neoplasms, does lead to the concentration of a particular type of tumor in the given strain.

Pursuing the attack further, Korteweg and the Jackson Memorial Group independently arrived at the same conclusion; namely, that in hybrid females, offspring of females of high-tumor strains and males of low-tumor strains, carcinoma developed in approximately the same percentage as in those of the high-tumor strain, but when the reciprocal cross was made, the incidence was a little higher. This conclusion led the investigators to conclude that there was an extra chromosomal factor within the parent which she was capable of transmitting to her offspring.

Bittner, therefore, conceived the idea that this transmission took place through the mother's milk. Subsequently, by removing mice of a high-tumor strain from their mothers immediately after birth, he proved conclusively that in mice, at least, a carcinogenic hormone is present in milk.

Currently there are about 100 strains of homozygous mice available in the United States. Strains have been developed not only with a high percentage of mammary tumors (the type employed in most of the aforementioned experiments) but strains with a high percentage of gastric carcinomas, lung tumors, liver tumors and bone tumors. MacDowell and Furth have also produced high leukemia strains. Experimental evidence has shown that the extra chromosomal factor in milk does not influence the growth of other malignant tumors in mice; therefore, it is reasonable to assume that there are extra chromosomal factors involved in each instance and for each malignant lesion and that the disease is not one but a group of diseases, conveniently but improperly classified under the one "cancer." Since it has been definitely proved that in the experimental mouse there is at least one carcinogenic extra chromosomal hormone associated with mammary tumor, it would be easy to theorize, but hard to prove, the presence of an extra inhibitory chromosomal factor originating in the walls of the duodenum.

In any event, regardless of the cause of cancer in general, whether traumatic, embryonic, biochemical, infectious, genetic or hormonal, the duodenum has built up a barrier to the encroachment of the condition, the nature of which is a direct challenge to scientific skill and equipment, both mental and physical.

SUMMARY

The infrequent occurrence of malignant tumors of the duodenum has led the author to a study of its possible causes. In this article, he considers in turn the traumatic embryonic, biochemical, infectious, hormonal and genetic theories of cancer. As yet the relative immunity of the duodenum is unexplained. In the author's opinion this question is an additional challenge to the profession in its perpetual fight against malignant disease.

ZUSAMMENFASSUNG

Die Seltenheit boesartiger Erkrankungen des Zwoelffingerdarms hat den Verfasser veranlasst, die diesem Phaenomen zugrundeliegenden Ursachen zu untersuchen. Er beschaeftigt sich der Reihe nach mit den traumatischen, embryologischen, biochemischen, infektioesen, genetischen und hormonalen Theorien der Krebsentstehung. Trotzdem bleibt die relative Immunitaet des Zwoelffingerdarms unerklaert. Der Verfasser sieht in diesem Problem eine weitere Anspornung der Aerzteschaft in ihrem ewigen Kampf gegen den Krebs.

RIASSUNTO

La rarità dei tumori maligni del duodeno ha spinto l'autore a condurre uno studio delle cause che governano questo fatto. Egli ha preso in considerazione tutte le teorie, traumatiche, embrionali, infettive, biochimiche, genetiche e ormonali; la relativa immunità del duodeno non è spiegabile. Nell'opinione dell'autore questa è una ulteriore sfida al medico nella sua eterna lotta contro i tumori maligni.

SUMÁRIO

O autôr procurou estudar a causa da pouca frequencia de afecções malignas do duodeno, o que fez, considerando as diversas teorias de desenvolvimento do cancer, tais como a traumatica, a embriologica, a bioquimica, a gênética e a hormonal.

Verificando que até o momento não se possa chegar a uma explicação razoavel para a relativa imunisação do duodeno ao cancer, conclue o autôr afirmando constituir o assunto uma preocupação a mais para os cientistas, em sua luta ardua e permanente contra as afecções malignas.

RÉSUMÉ

L'Auteur étudie les causes des lésions malignes rares du duodénum. Tour à tour, il passe en revue les théories du cancer:

traumatique, embryonaire, biochimique, infectieuse, héréditaire et hormonale. Pourquoi le duodénum est relativement immunisé, l'auteur se l'explique difficilement. D'après lui, cette question est une provocation à laquelle la profession médicale doit s'attaquer.

RESUMEN

Lo infrecuente del cáncer duodenal ha conducido al autor al estudio de las causas inherentes. A este respecto, ha considerado sucesivamente las torías traumática, embriogénica, bioquímica, infecciosa, genésica y hormonal sobre el cáncer. A pesar de esto, permanece sin explicación la relativa inmunidad del duodeno. El autor opina que esta interrogación accesoria constituye un reto más a la profesión en su perpetua lucha contra el cáncer.

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A New Surgical Approach for Repair of Recurrent Direct Inguinal Hernia

A Preliminary Report

WILLIAM M. McMILLAN, M.D., F.A.C.S., F.I.C.S., AND
ROBERT T. McELVENNY, M.D., F.A.C.S.
CHICAGO

DIRECT inguinal hernias that recur after several attempts at surgical correction pose a serious problem. Not only are the patients discouraged mentally, but they frequently become economic misfits unable to earn a livelihood. It is difficult to secure accurate statistics, and there is considerable variation in the recurrence rates given in reports of herniorrhaphies for recurrent direct inguinal hernias. However, the literature presents figures up to 34 per cent, as reported by Grace and Johnson.[1]

We should like to present a new surgical approach to the problem, which, in our opinion, offers anatomically a much better chance of permanent cure than any method thus far suggested.

Previous attempts to solve this problem have been based on either a shift of the endo-abdominal fascia to cover the defect in Hesselbach's triangle or the introduction of a new support foreign to this area —either a transplant of fascia or bone or a metal plate or screen. In addition, Cooper's ligament, which is in reality a blending of the periosteum over the crest of the pubis and the pectineal fascia, has been described as valuable in anchoring the sutures employed in the repair of such hernias. This, however, does not help to cover the defect. The other methods have been found wanting for the following reasons: First, in employing a fascial transplant or in using the transversalis fascia native to this area, one must use the fascia of that particular patient; this fascia has already proved inadequate, for if it had been adequate the hernia would not have recurred. Second, in using any type of foreign body, whether bone transplant, skin or metal support, the permanent fixation of this internal truss poses a problem, as it must be fixed about its entire perimeter.

In 1949 one of us (R. T. M.) made a study of the anatomy of the superior ramus of the pubis in anatomic specimens and observed that the anterior and superior aspect of the pubic ramus would permit the elevation of a strip of periosteum medial to the femoral vein, extending to the middle of the pubis, and suggested we make use of this osteoperiosteal flap in the repair of recurrent direct inguinal hernias. We made some further studies and found that a periosteal flap could be

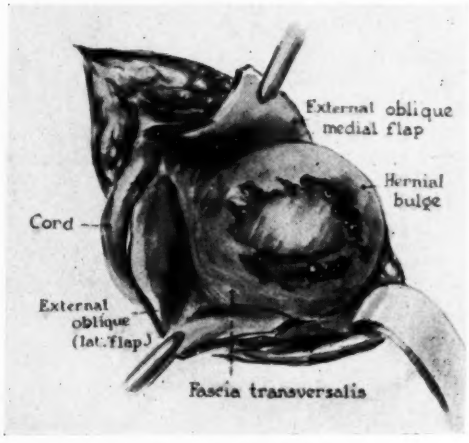

Fig. 1.—See text.

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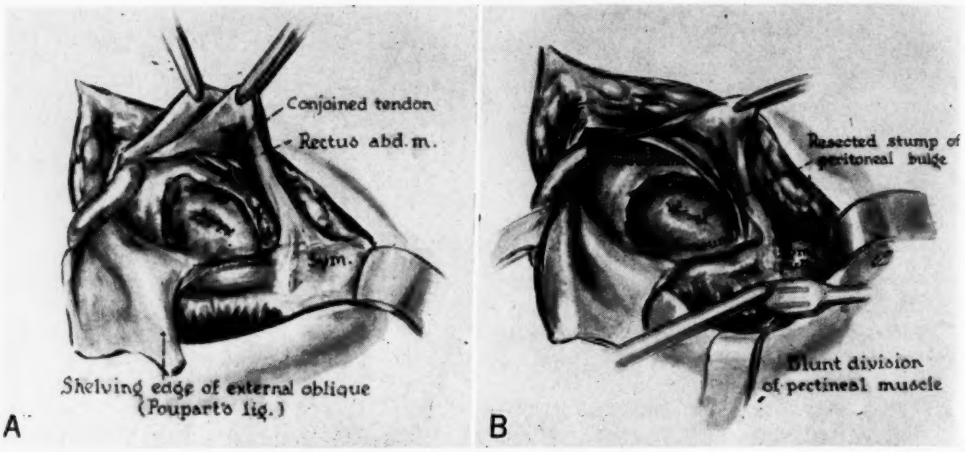

Fig. 2.—See text.

raised in this manner which measured on the average, 2 inches (5 cm.) transversely and 1½ inches (3.7 cm.), in width at the widest point laterally.

This osteoperiosteal flap is started over the anterior inferior aspect of the pubis and when elevated is continuous with, and a part of, the periosteum lining the inner aspect of the superior pubic ramus. This flap is not a foreign body but a living anatomic structure; and, being continuous with the periosteum of the inner aspect of the superior ramus of the pubis, it does not permit bulging or stretching along its lower margin.

In the early part of 1952 I first carried out this procedure on a patient who had been operated on twice before and who now had an enormous hernia associated with a large defect in the transversalis fascia. It may be added that the remaining transversalis fascia was very thin and gave little hope of a secure repair. The technic employed may be briefly described as follows: The usual incision for inguinal herniorrhaphy is made through the skin, the subcutaneous tissue and the external oblique muscle. The cord is freed and elevated on cord tape; transversalis fascia flaps are prepared; the peritoneum is opened, and the hernial sac is resected and closed in the usual manner. Poupart's ligament is then severed from its medial attachment at the pubis and along its lower margin as far laterally as the femoral vein. The femoral vein is retracted laterally and protected from injury (Figs. 1 and 2*A*). The pectineus fascia is then incised transversely over the lower margin of the pubic ramus. The pectineus muscle is then sectioned by scraping away its fibers, and thereafter the inferior anterior margin of the ramus of the pubis is exposed (Fig. 2*B*). A periosteal flap is raised, starting with a transverse incision through the periosteum extending from the level of the retracted femoral vein along the lower margin of the inferior anterior aspect of the superior ramus of the pubis medialward to the middle of the symphysis (Fig. 3*A*). Below one can see the thin fascial layer overlying the obdurator foramen, which carries within its layer numerous small vessels. The flap is then elevated, carrying with it a thin layer of bone so as to prevent perforation of the flap. After the flap has been freed well upward and inward, there is a firmly attached flap continuous with and a part of the periosteal lining of the pubic ramus (Fig. 3 *B*). This flap is then turned superiorly and medially and secured to the medial flap of the endoabdominal fascia, and the suture also

includes the lateral edge of the rectus sheath. Thereafter, the medial end of Poupart's ligament, previously detached, is fixed to its original site. This brings the lateral flap of the external oblique external to the periosteal flap, thus forming an additional support to this area. The aponeurotic falx or conjoined tendon is then sutured to the shelving edge of Poupart's ligament in the usual manner, after which the spermatic cord is dropped back and the edges of the external oblique are united anterior to the cord, thus completing the repair (Fig. 3*C*, and *D*).

This new approach for the repair of recurrent direct inguinal hernia has been carried out in 4 cases up to the time of writing, but it is too early to evaluate the end results accurately. It is our opinion, however, that it represents a logical approach to this type of problem, as it has a sound anatomical basis and makes use of structures which, even in the poorest prospect, are always entirely adequate in strength.

In conclusion I should like to state that we are recommending the use of this procedure only in those cases of recurrent

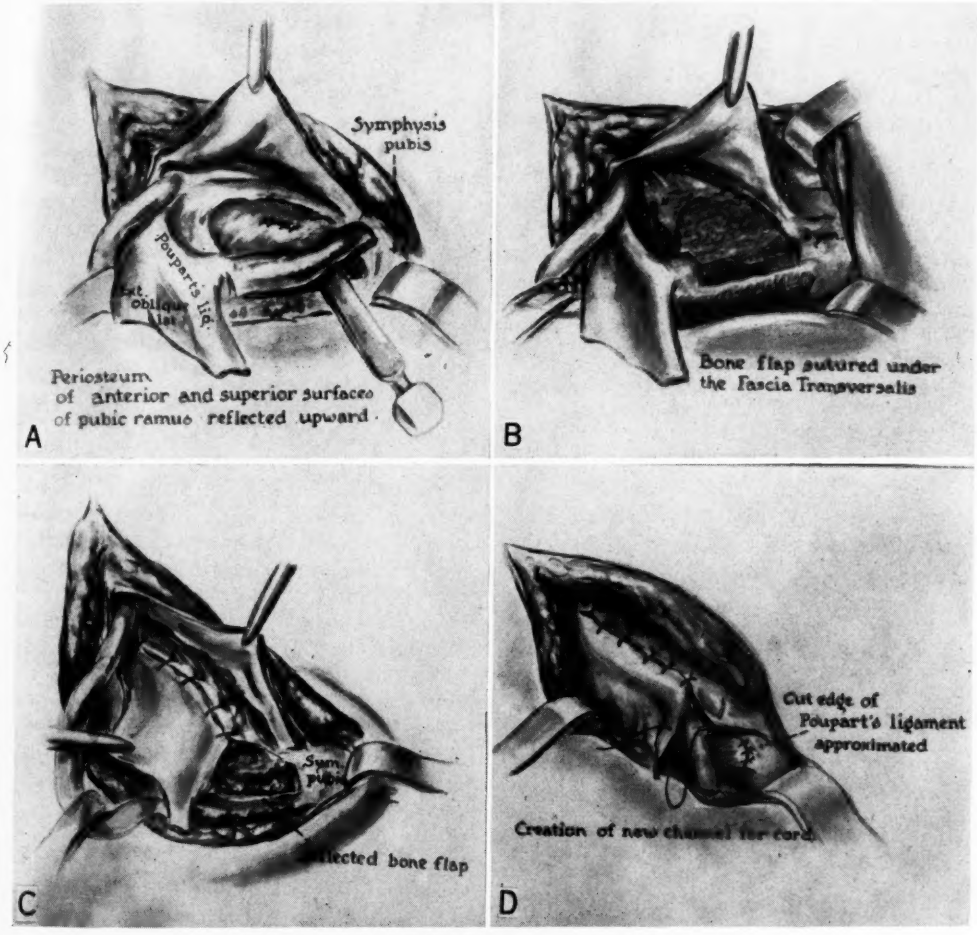
Symphysis pubis
Poupart's lig.
Periosteum of anterior and superior surfaces of pubic ramus reflected upward
A
Bone flap sutured under the Fascia Transversalis
B
Cut edge of Poupart's ligament approximated
Creation of new channel for cord
D

Fig. 3.—See text.

direct inguinal hernia in which the poor condition of the fascia indicates that the usual orthodox method holds out little hope of cure, or in cases in which there is a history of repeated recurrences. If employed in such cases, we consider it a logical anatomical approach to the problem under discussion.

RESUMEN

Se presenta una discusión preliminar sobre los problemas relativos a la hernia inguinal directa con múltiples recidivas.

Se discute la anatomía del área correspondiente a la hernia inguinal directa, particularmente en lo que se refiere a la rama superior del pubis. Se presenta un método para el tratamiento de la hernia inguinal directa multirecidivante, utilizando la aponeurosis pectínea y el periostio de la rama superior del pubis.

Aunque este método so deriva radicalmente de los métodos empleados generalmente hasta ahora, dado que implica la elevación del periostio sobre una amplia área del pubis, así como el transplante del ligamento de Poupart, es en opinión del autor, un valioso procedimiento para aquellos casos de hernia inguinal directa en los que se haya fracasado con los otros métodos.

RÉSUMÉ

L'auteur discute des problèmes des récidives de l'hernie inguinale directe. L'anatomie est revisée; de même qu'une technique personnelle utilisant le fascia et le périoste de la branche supérieure du pubis. Ce procédé est entiérement nouveau; cependant, il a ses indications opératoires surtout pour corriger les récidives des hernies directes.

RIASSUNTO

Viene tratteggiato il problema relativo all'ernia inguinale diretta con recidive multiple.

Viene descritta l'anatomia della regione interessata dall'ernia, con particolare riguardo per il ramo superiore del pube, e presentato un metodo per la cura delle recidive multiple, utilizzando la fascia pettinea e il periostio del pube.

Benchè il metodo si allontani radicalmente da quelli in uso, poichè implica l'innalzamento del periostio sopra un'ampia zona di pube e il trapianto del legamento inguinale, tuttavia, almeno nell'opinione dell'autore, è assai efficace proprio nei casi in cui gli altri metodi sono falliti.

SUMÁRIO

De inicio é apresentado um estudo sôbre os problemas determinantes das inumeras recidivas das hernias inguinais diretas. A anatomia da região interessada é descrita com particular referencia ao ramo superior do pubis.

Um processo de utilização do fascia pectineo e do periosteo do ramo superior do pubis é preconizado para a cura das hernias inguinais diretas recidiviantes. Pensa o autôr que o seu metodo é de grande valia nos casos em que os processos mais simples foram aplicados sem êxito, uma vez que determina êle um alteamento do periosteo sôbre extensa area do pubis, tanto quanto nos transplantes do ligamento de Poupart.

ZUSAMMENFASSUNG

In der Einleitung werden die den wiederholt rueckfaelligen direkten Leistenbruechen eigenen Probleme eroertert.

Die anatomischen Verhaeltnisse der von der direkten Leistenhernie betroffenen Gegend werden unter besonderer Beruecksichtigung des oberen Schambeinastes besprochen. Es wird eine Methode der Reparierung wiederholt rueckfaelliger direkter Leistenbrueche dargestellt, die sich der Pektineusfaszie und des Periosts des oberen Schambeinastes bedient. Obgleich diese Methode von den zur Zeit allgemein angewandten Verfahren insofern voellig abweicht, als sie sowohl eine Abloesung der Knochenhaut von einem umfangreichen Gebiet des Schambeins al-

auch eine Transplantierung des Poupartschen Ligaments erfordert, stellt, sie nach der Meinung des Verfassers doch ein wertvolles Verfahren in Faellen von direkten Leistenbruechen dar, wo andere Methoden versagt haben.

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Echoes of the Past

XXXII. Constantine, The African, and the Salerno School of Medicine

Arabian influence on ancient medicine was graciously received at Salerno and thus without hindrance throughout the west. This reception was due largely to the personality of Constantine, the African.

Constantinus Africanus was born in Carthage in 1018 and manifested interest in medicine at an early age. He traveled extensively—to the Orient, to Mesopotamia, to India, to Byzantium and finally for a short time, to Salerno. His activities centered about translating Arabic medical literature. For many decades his *Pantechne* (Pantegni), a Latin translation of a work by the Persian Ali al Magusi, personal physician to the Emir of Bagdad (tenth century), played a leading part in influencing medical literature. It consisted of ten books dealing with the theory and practice of medicine.

Although Constantinus did not translate the most important works of the Arabs, he introduced the golden age of Salerno and the most productive epoch in medieval medicine. At Salerno there now appeared, under the influence of the newly available Arabic sources, a growing desire for logic, consistency and an understanding of the role of theory. It was probably owing to this Arabic influence that attempts were instituted at Salerno to explain diseases and their cure on an anatomic basis.

Prior to the Arabic influence interest in anatomy had been slight, and in the first Salernian writings the anatomic aspect remains entirely in the background.

It was due to Constantinus that surgery became a scientific study. The Arabic physicians practiced only minor surgery; like the Christian physicians, they opposed, as a matter of religion, the shedding of blood. Arabians used the cautery in lieu of the scalpel. Christian medicine prior to Constantinus was untaught in surgical methods. Surgical operations were performed by housekeepers and charlatans.

With the onset of the Crusades, surgery appeared in a new light. The many wounded soldiers demanded treatment, and surgical methods developed out of necessity; but it was not until the appearance of *Practica Chirurgiae* (1180) Roger Frugardi of Salerno, that surgery passed from the hands of mountebanks into those of physicians. This work is the oldest surgical text in Christendom, and it is founded upon the material of Constantinus.

—*Bernard J. Ficarra,* M.D., F.I.C.S.

Obligations in the Treatment of Cancer of the Skin

NEAL OWENS, M.D., F.A.C.S., F.I.C.S.
NEW ORLEANS, LOUISIANA

BECAUSE of numerous considerations which one who treats cancer must constantly keep in mind when presuming to offer advice—minimal disturbance to the patient, the greatest opportunity for complete eradication and cure, and minimal effects followed by satisfactory reconstruction and rehabilitation—an overall survey of the entire problem is extremely important. Perhaps one of the most valuable steps in the treatment of cancer is the fulfillment of an obligation in the development of an educational program for the presentation of fundamental facts necessary for the correct appraisal of this problem by the patient. Much has already been accomplished through existing educational programs, but there is also the demand for further effort in expanding the already existing programs. Much may be accomplished by correctly appraising many problems that have been inaccurately presented or have not as yet offered. Much needs to be done in proper organization of these educational programs in order to avoid duplication of effort and to emphasize the proper concept. Far too much emphasis has been placed on many aspects of the problem to insure the patient's peace of mind, and in like manner much unnecessary concern and worry emanates from the presentation of information in a haphazard fashion.

One of the most common concerns of the patient who is conscious of the presence of a visible growth or some symptom that suggests the possibility of cancer is the possibility of inheriting cancer. Educational programs can do much to emphasize that cancer is not inherited, at the same time calling attention to the fact that one does inherit a predisposition to the development of cancer. One cannot seriously question this statement; far too many examples are available which present definite evidence of an inherited predisposition. The educational programs, therefore, can emphasize to descendants of persons in whom cancer has developed the importance of being more diligent in avoiding habits that might predispose to unnecessary irritation and of observing and following health programs designed to interest the prospective patient in periodic health examinations and surveys. Likewise, the establishment of knowledge that cancer itself is not inherited will relieve many persons of unnecessary worry.

This particular phase of an educational campaign is extremely important. Any program that frightens or worries people unnecessarily will ultimately lose its effect. Causing unnecessary concern and fear will neutralize any good that might otherwise result from the program's development Far too many people spend useless hours of torture as the result of faulty evaluation of facts or improper appraisal of their status, assuming all too readily that they actually have cancer. Infinitely more good can follow proper teaching of certain fundamentals in the appraisal of potential cancer; if these basic facts are presented so as to direct the patient's will toward acceptance of proper care through routine examinations and the avoidance of habits that cause chronic irritation, they may accomplish a great deal. Also of importance is the removal of questionable lesions and the avoidance of procrastination.

Much good can also come from infor-

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mation that clearly reveals the importance of an established diagnosis by a competent physician before treatment is accepted. Attention should be directed toward the danger of irradiation administered after a casual office survey, without the benefit of a proved diagnosis. There is far too much variation in the appearance of surface lesions, whether malignant or nonmalignant, to permit an accurate diagnosis from a cursory examination. Many premalignant lesions have characteristics of true malagnancy; on the other hand, many malignant lesions have a deceptively innocent appearance. Patients should be impressed with the importance of taking a biopsy specimen from any tumor that is considered for treatment. Practically all precancerous and early malignant lesions are sufficiently discrete to permit proper surgical extirpation by the surgical procedure required for an ordinary biopsy. If one can completely remove a discrete lesion while procuring tissue for a biopsy, and thus establish proof that a lesion, whether malignant or premalignant, has been adequately removed, then no further surgical intervention is required. Certainly one would not subject a patient to this procedure in order to justify irradiation therapy, for under such circumstances further treatment is unnecessary.

Far too many lesions are inadequately examined, and, of course, the natural sequel is inadequate treatment. Not infrequently the patient is told that the growth needs a bit of roentgen or radium treatment. When a patient is subjected to such treatment one never knows afterward whether the growth was malignant or not malignant; one never knows, either, except by the passage of time, whether it was cured. One does know, however, that in attempting to cure by such methods one leaves changes following irradiation which later may become foci for the development of cancer. Again, when patients are advised to accept a course of irradiation treatments for any specific lesion, they should know that it is important to procure sufficient evidence in advance that the growth is of a type that will respond to irradiation. Frequently one sees patients who have been treated with roentgen or radium therapy whose lesions are of a type that would contraindicate such treatment. Among these are patients with pigmented lesions, such as melanoma, tumors of the parotid (many of which are mixed tumors), and leukoplakia. None of these tumors will respond to irradiation; in fact, it is definitely contraindicated for all of them. Its use, therefore, can only cause harm by partial destruction of the tissue, inducing changes that may well convert an otherwise benign tumor into a malignant one, and irreparable damage due to delay.

Dissemination of information of this type is an obligation of all who treat cancer. Emphasis on the necessity for complete eradication as proved by biopsy, without consideration of the resulting defect, is important if one expects to give a patient clear insight into the proper management of cancer problems. Frequently, patients or those concerned with their care are permitted to "compromise" in the treatment of malignant conditions because they object to the possible disfigurement that may be involved. No greater mistake can be made than to permit the treatment of cancer in any manner short of complete eradication. Until a malignant tumor has been eradicated, one should never let himself think of reconstruction or repair, lest he be tempted to compromise with total extirpation. One should hold steadfastly to the premise that the treatment of cancer, although it has two phases, must be approached in an unalterable sequence: (1) the complete eradication necessary to insure a cure, and (2) subsequent reconstruction and rehabilitation.

Unless this information is disseminated to the lay public there will continue to be too many persons, fearful of the unsightly defects that may follow proper treatment, who permit themselves to be lulled into a false sense of security and accept a treatment by methods that cannot cure. When this thinking prevails or this type

of procedure is followed, the inevitable result is failure—and failure often becoming evident at a stage when the disease has progressed to inoperability. No sadder picture is presented to a surgeon dealing with the treatment of malignant disease than that of the patient who has been under inadequate treatment for years and then approaches the surgeon for relief, only to find that during the interval of false security the disease has metastasized extensively and the tumor is inoperable. In such cases it is often all too clear that, had the proper procedure been initiated earlier or had someone had the determination to take the case strongly in hand and proceed with the necessary eradication, cure might have been possible.

It is highly important that information of this sort should be disseminated to the public. Patients should be taught to seek cure *early*, through radical surgical intervention to insure complete extirpation, regardless of the defects that may result. They should be promised, of course, and at the same time they receive this information, that after the eradication and a proper period of observation for evidence of residual disease, a satisfactory reconstruction may be available. This information should be supplemented by case reports and, if necessary, photographic records, to illustrate what has been accomplished in other cases.

To be entirely honest, one frequently has to call attention to the possibility that a given malignant tumor may be too extensive to permit complete extirpation. Yet in many such cases radical excision offers an opportunity of potential cure and prolongation of life with a greatly lessened suffering. Even under these circumstances, a person who fails to seek treatment may be confronted with the horrible picture of a rapidly growing malignant lesion that in itself can cause defects far more unsightly and horrible than those which would follow surgical intervention. When complete cure is denied but life is prolonged over a period of years, many patients approach the final stage, and the realization that their days are numbered, with truly impressive fortitude and a tenacity. I have talked with patients who had gone through a number of radical surgical procedures, many of which were mutilating and associated with pain and anxiety, only to discover in the end that they were denied the cure they so desperately sought. In retrospect, despite failure to obtain a complete cure, and in spite of the disfigurement and suffering they had endured, they were very grateful for the extended period of life offered them by surgical treatment. Some of them have emphasized the sincerity of their statements by saying that if they had the entire course to go over again, with all the knowledge gained by the experience, they would have no hesitancy in asking that these same procedures be offered them again.

Another serious obligation of those who treat cancer is acceptance of the fact that it is their duty not only to advise but in many instances to urge, coerce or even force patients to seek treatment. A condition clearly recognizable as a dangerous premalignant, or early malignant or advanced malignant lesion, possibly curable, is not to be trifled with. A man standing on his own doorstep to welcome a guest would not hesitate to grasp a club and forcibly strike the guest with sufficient force to deter his course, if he saw him approaching an area known to conceal a rattlesnake. This, in all justice, would be considered a friendly gesture even if the blow were sufficient to injure the guest. Yet all too frequently we stand idly by, observing lesions that lead to certain death, and fail to develop the force we need to bring the patient to solicit proper treatment. Yet only by devoloping this force can we prevent procrastination to the point of inoperability.

Another tremendous adjunct to the endeavor toward the prevention and cure of cancer is the dissemination of knowledge with regard to the possibilities of reconstruction and rehabilitation. As a result of recent advancements in surgical knowledge and refinements of technic, a

higher degree of rehabilitation is possible. Patients can be restored to the category of those who mingle with their fellow men and pursue worth-while occupations. Once the profession and the lay public realize that this type of restitution is available, a great part of the dread of radical treatment for cancer will have been removed, and there will be a proportionate increase in the number of patients who solicit treatment even for rather advanced cancer.

Another valuable phase in the proper treatment of malignant disease is the adequate follow-up survey of patients under treatment. The importance of this obligation is known to all who treat malignant disease. It is a natural sequel to the knowledge that no eradication of a malignant tumor can guarantee permanent cure. The most carefully planned course of treatment, the most accurate pathologic study of the biopsy specimen, cannot entirely eliminate cases in which time presents the surgeon with indisputable evidence that residual disease is present or that metastasis has taken place in patients who formerly showed no sign of it. Only by adequate follow-up surveys of these patients can they be properly guarded and subsequently treated; otherwise, much procrastination will ensue, and with this procrastination early evidence of residual disease or metastasis, which might still be properly eradicated, will have advanced to inoperability before the surgeon is notified of its existence.

Proper response to follow-up investigations frequently depends on the attitude and approach of the surgeon. It must be clearly recognized that the psychic effect of follow-up requests on patients may be unfortunate, causing them in some instances to suspect a financial interest on the surgeon's part. One must offset the possibility of this reaction. Personally, I do this by removing the financial implication entirely. No patient can suspect the urge for financial gain if he is not permitted to pay on follow-up visits. This may impose the loss of some remuneration, but without this loss it is extremely difficult to develop a successful follow-up program.

It is probably justifiable to ask patients to return for follow-up visits at least every month or two months during the first two to three years after excision of a malignant lesion. Certainly he should be examined every three to six months during the next two years and a close contact maintained for at least five. Establishment of the fact that follow-up visits not only will not be charged but that charges are not permitted, even if the patient desires them, will be extremely helpful in developing a high percentage of follow-up studies. The monetary loss incurred in such a system is amply repaid by the satisfaction of following these patients and in being able to diagnose residual disease or metastasis at an early stage.

SUMMARY

The problem of education of the general public with regard to cancer, and its bearing on the surgeon's moral and professional responsibilities thereto, are discussed. The author strongly emphasizes radical extirpation as the only admissible treatment and stresses the surgeon's responsibility for early and accurate diagnosis, adequate treatment, and honesty in dealing with the patient.

RÉSUMÉ

L'auteur disserte sur les répercussions publiques et professionnelles du cancer. Il insiste sur l'extirpation totale comme seul traitement admissible et demande une grande franchise vis-à-vis du patient.

RESUMEN

Se discuten el problema de educación del público respecto al cáncer y lo que atañe a las responsabilidades moral y profesional del cirujano. Se señala firmemente que la extirpación radical es el único tratamiento admisible y se puntualiza la responsabilidad del cirujano para el

diagnóstico temprano y seguro, el tratamiento adecuado y la honestidad en la atención del paciente.

RIASSUNTO

Viene trattato il problema dell'educazione del grosso pubblico nei confronti del cancro, e del suo peso sul morale del chirurgo e sulle responsabilità professionali. L'autore sostiene energicamente la tesi dell'estirpazione radicale come unica cura pssibile e sottolinea la responsabilità del chirugo nella diagnosi corretta e precoce quanto nella cura adatta; e l'onestà nei riguardi del malato.

SUMÁRIO

O autôr estuda o problema da educação do pôvo com relação ao cancer, comparando-a à moral profissional do cirurgião, no particular. Preconiza êle, com enfaze, a extirpação larga e radical como unico tratamento admissical para o cancer, e salienta a importancia da responsabilidade e honestidade do cirurgião que intervem no paciente, para que seja feito um diagnostico precoce e exato, e para que seja seguido um tratamento adequado para o caso.

ZUSAMMENFASSUNG

Der Verfasser eroertert das Problem der Erziehung der Oeffentlichkeit in der Krebsfrage und die damit verbundenen moralischen und beruflichen Verantwortlichkeiten des Arztes. Er betont mit Nachdruck, dass eine radikale Entfernung des Krebses die einzige zulaessige Behandlung ist und hebt die Verantwortung des Chirurgen fuer eine fruehzeitige und richtige Diagnose, fuer ausreichende Behandlung und fuer eine ehrliche Haltung dem Kranken gegenueber hervor.

Announcement

International Section of Occupational Surgery

The Executive Council of the United States Section and the Board of Trustees of the International College of Surgeons have unanimously approved the formation of an International Section of Occupational Surgery, the aims of which are (*a*) elevation of standards for the practice of occupational surgery, (*b*) conservation of the health of the worker after occupational injury, (*c*) official recognition of this specialty, (*d*) stimulation of interest in this field by students and members of the profession, and (*e*) cooperation in the establishment of facilities for graduate education in occupational surgery by means of residencies in hospitals affiliated with medical schools, or their equivalents.

For further details, address Dr. Chester Guy, Secretary, United States Chapter, International College of Surgeons, 1516 Lake Shore Drive, Chicago 10, Illinois.

Transactions of the

Seventeenth Annual Congress

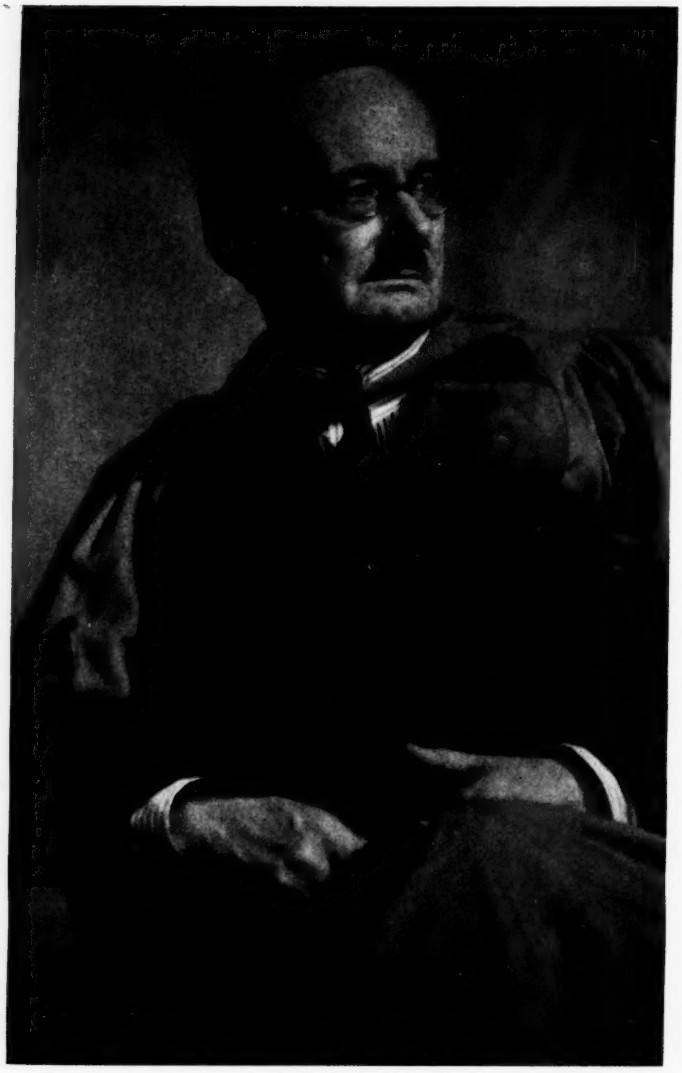
of the

United States and Canadian Sections

International College of Surgeons

Chicago, Illinois

September 2 - 5, 1952



The Rt. Hon. Lord Horder, G.C.V.O., M.B., M.D., F.R.C.P. (London), London, England. Lord Horder's address to the recent Congress of the United States and Canadian Sections, International College of Surgeons, appears on Page 799 of this issue.

Seventeenth Annual Congress United States and Canadian Sections

The Conrad Hilton Hotel, Chicago, September 2-5, 1952

IN prospect, the program of the Seventeenth Annual Congress of the United States and Canadian Sections of the International College of Surgeons offered decided allurement; in retrospect it shines with the bright glow of hopes fulfilled and exceeded.

The planners rejoiced at the enthusiastic response to their efforts. The speakers and discussion leaders gave spirited and informative presentations. The audiences expressed themselves as having received in abundant measure what they came for—new facts, new ideas, and renewed inspiration; new and renewed acquaintanceships; keener appreciation of the value of Fellowship in an organization which is world-wide in its influence for the advancement of the art and science of surgery.

It was a busy, exciting four days of teaching and learning, talking and listening, showing and looking, working and playing, and wishing that the next great gathering of this congenial group were not twelve months away.

General Scientific Sessions: The general scientific sessions opened on Tuesday morning with a "Gallbladder Symposium." This was followed by a luncheon meeting with the speakers of the morning forming a panel; Dr. Arnold S. Jackson of Madison was the moderator. Each morning and afternoon thereafter equally outstanding programs were presented. Among the most interesting was the Wednesday afternoon session arranged by the Canadian Section with six Canadian surgeons and one British surgeon as speakers, as follows: Dr. J. Burke Ewing of Ottawa on "The Management of Carcinoma of the Oesophagus"; Dr. D. W. Gordon Murray of Toronto on "The Surgical Treatment of Coronary Thrombosis"; Dr. Peter E. Rees-Davies of Vancouver on "Pectus Excavatum'; Dr. Eugene F. Balangero of Montreal on "Postoperative Intestinal Obstruction"; Dr. D. L. C. Bingham of Kingston on "Intra-arterial Transfusion—Its Role in the Treatment of Shock"; Dr. Lyon H. Appleby of Vancouver on "Unusual Lesions of the Small Bowel"; and Mr. Denis John Browne of London, England, on "Progressive Surgical Principles."

Among the excellent presentations on the Thursday morning program were two memorial addresses: the Herbert Acuff Memorial Address by Dr. Alexander Brunschwig of New York City on "Feasibility of Prolonged Survival After Total Pelvic Exenteration for Advanced Cancer" and the Curtis Lee Hall Memorial Address by Dr. Henry W. Meyerding of Rochester, Minnesota, on "Volkmann's Ischaemic Contracture."

Surgical Specialties: Competing with the general sessions for attendance, yet leaving them crowded nevertheless, were six sessions on Ophthalmology and Otolaryngology, two on Plastic Surgery, four on Obstetrics and Gynecology, four on Urology, two on Orthopedic Surgery, and one on Occupational Surgery. A few of the specialties had luncheon meetings in addition.

The Eye program included surgery and dry clinics held at the Chicago Eye, Ear, Nose and Throat Hospital; a "Study Club" on "Important Maneuvers in Ophthalmic Surgery"; and a round table discussion of "Complications of Cataract Surgery." The Ear, Nose and Throat program included a "Study Club" on "Present Status of Submucus Resection"; and a round table discussion of

"Surgical Management of Bilateral Recurrent Laryngeal Paralysis."

The one-day, two-session program on Plastic Surgery was outstanding for its array of speakers, among whom were many leading authorities in the field. The Obstetrical and Gynecological division program was planned to commemorate the centenary of publication of Marion Sims' Treatise on Vesicovaginal Fistula. The Urology sessions offered symposia on "Carcinoma of the Bladder" and "Retroperitoneal Tumors", besides a number of individual papers of great interest. Orthopedic problems of wide range were presented and discussed in the excellent program conducted by the Orthopedic Division. Among the timely subjects presented in the session on Occupational Surgery was a discussion of "Rehabilitation of the Severely Disabled" by the medical director of the famous New Jersey Rehabilitation Clinic, Dr. Henry H. Kessler of Newark.

Speakers from Other Countries: Besides Lord Horder and Mr. Browne, several eminent surgeons from other countries were featured speakers in the Assembly program. Among them were the following eminent surgeons:

H. Kenrick Christie, M.B., F.R.C.S. (Eng.), F.R.A.C.S., F.R.S.M. (Eng.), F.I.C.S., Wanganui, New Zealand; Orthopedic Surgeon, Wanganui Hospital — speaker on "Internal Derangements of the Temporo-Mandibular Joint" at the Thursday morning session of the Orthopedic Division.

Prof. Raymond Darget, M.D., F.I.C.S. (Hon.), Bordeaux, France; President, French Section, International College of Surgeons; Professor of Clinical Urology,

Left to right: Dr. Morris Fishbein, Chicago; Dr. Horace E. Ayers, New York; The Rt. Hon. Lord Horder, London, England; Dr. Max Thorek, Chicago; Dr. Bernhard Zondek, Jerusalem; and Dr. Elmer Henderson, Louisville.

Seated-left to right: Prof. Raymond Darget, Bordeaux, France; Dr. Max Thorek, Chicago; The Rt. Hon. Lord Horder, London, England; Dr. Karl A. Meyer, Chicago; Prof. Bernhard Zondek, Jerusalem; Mr. Denis John Browne, London, England. *Standing—left to right:* Dr. Ulysses G. Dailey, Chicago; Dr. M. S. Thakker, Bombay, India; Dr. M. Leopold Brodny, Boston; Dr. J. M. de los Reyes, Los Angeles; Prof. Tokuji Ichikawa, Tokyo; Dr. Arnold S. Jackson, Madison, Wisconsin; Dr. Constant Pierre-Louis, Port-au-Prince, Haiti.

University of Bordeaux; Surgeon, Hopital du Tondu—speaker of "Radium Treatment of Malignant Tumors of the Bladder" at the Wednesday afternoon session of the Urology Division.

Pieter Leguit, M.D., F.I.C.S., Amsterdam, The Netherlands; Assistant Professor of General Surgery, University Clinic, Binnengasthuis — speaker on "Recurrent Dislocation of the Shoulder" at the Thursday afternoon session of the Orthopedic Division.

Domingo Lucca Romero, M.D., M.S.V.C., Caracas, Venezuela; Plastic Surgeon, Hospital Vargas; Chief of Plastic Surgery Service, Instituto Luis Razetti—speaker on "Elephantiasis of the Extremities: Their Surgical Treatment" at the Tuesday morning session of the Plastic Surgery Division.

Mr. Harold Ridley, M. A., B.Chir. (Cambridge), F.R.C.S. (Eng.), London, England—speaker on "Further Observations on Intra-ocular Acrylic Lenses in Cataract Surgery" at the Thsurday morning session of the Ophthalmology-Otorhinolaryngology Division.

Bernhard Zondek, M.D., Jerusalem, Israel; Professor of Gynecology and Obstetrics and Chief of Hormone Research Laboratory, Hebrew University Hadassah Medical School—speaker on "Some Problems of Ovarian Function and Gonadal Hormones" at the Wednesday afternoon

session of the Obstetrical and Gynecological Division.

Allied Science Division: Meeting for the first time, the new Allied Science Division, under the chairmanship of Dr. Arthur C. Guyton of University, Mississippi, Professor of Physiology and Chairman of the Department of Physiology and Biophysics, University of Mississippi School of Medicine, presented an excellent program. Dr. Josiah J. Moore of Chicago opened the meeting with an informal discussion of "The Pathologist and the Surgeon," followed by Dr. Walter L. Bloom of Emory University School of Medicine on "Experimental Aspects of the Use of Dextran as a Plasma Volume Expander"; Dr. Philip Thorek of University of Illinois College of Medicine and Cook County Graduate School of Medicine on "Basic Concepts of Jaundice and Biliary Surgery"; Dr. Archibald Ray Buchanan of the University of Colorado School of Medicine on "Anatomy of the Autonomic Nervous System with Special Reference to Surgical Interruption of Visceral Inhibitions"; Dr. Gail Monroe Dack of the University of Chicago School of Medicine on "Bacteriology of Chronic Ulcerative Colitis"; and Dr. William B. Deichmann of Albany Medical College on "Procedures to be Considered in the Prevention and Treatment of Intoxications by Parathion, its Dimethyl Analogue and Systox."

Dr. Benjamin M. Duggar of Pearl River, New York, who in 1948 isolated for Lederle Laboratories an organism that produced the antibiotic known as aureomycin. Dr. Duggar spoke at the Tuesday evening Forum on Antibiotics.

The members of this group endorsed enthusiastically the action of the College in endeavoring to bring the basic scientist and the College closer together, recommending, however, that in the future the basic science talks be given, not at a separate session, but distributed through the surgical sessions so that more surgeons may benefit by the discussions; this recommendation will be adopted.

Forum on Antibiotics: Among the most outstanding of the scientific meetings was the Tuesday evening Forum on Antibiotics held in the Grand Ballroom of the hotel and attended by a capacity audience. With Dr. Morris Fishbein as the moderator, a panel of scientific experts presented the latest developments in this field in which progress is being made so fast that surgeons are hard pressed to keep up with the discoveries which they should be familiar with the standpoint of practical application.

Dr. Raymond W. McNealy of Chicago began the discussion with remarks on "Antibiotics in Surgery with special Reference to Penicillin." He was followed by Lieut. Col. Edwin J. Pulaski of Washington on "Surgical Application of Antibiotics with Specific Reference to Streptomycin." The man who in 1950 was the leader of the team of Pfizer scientists which discovered the newest broad-spectrum antibiotic, "Terramycin," Jasper H. Kane of Brooklyn, Director of Biochemical Research and Production, Charles Pfizer and Company, Inc., discussed this product. "Aureomycin" was discussed by its discoverer, Dr. Benjamin M. Duggar of Pearl River, New York, Consultant in Micological Research and Production, Lederle Laboratories Division, American Cyanamid Company. "Bacitracin" was discussed by its co-discoverers, Dr. Frank L. Meleney, Professor of Clinical Surgery, Columbia University College of Physicians and Surgeons, and Miss Balbina A. Johnson, Director, Laboratory for Bacteriological Research, Department of Surgery,

Columbia University.

In this session it became pointedly clear that the surgeon, the research chemist, and the manufacturer of pharmaceuticals are increasingly bound together in the effort to make surgery constantly more safe and more effective for the patient.

The Film Forum: For the second year, a capacity audience was attracted to the Film Forum. The 1952 Forum was held in the Grand Ballroom on Wednesday evening, with Dr. Philip Thorek as chairman and Dr. Claude J. Hunt as moderator. Films, with explanation and discussion thereof, were presented on "Cardiac Surgery" by Dr. Charles P. Bailey of Philadelphia; on "Gallbladder Surgery" by Dr. N. Frederick Hicken of Salt Lake City; on "Carcinoma of the Rectum" by Dr. Wayne Babcock of Philadelphia; and on "Genitourinary Surgery" by an associate of Dr. Elmer Hess of Erie, Pennsylvania.

Scientific Motion Picture Program: The motion picture theater in the North Lounge of the hotel was in continuous operation every morning and afternoon. A carefully selected list of films were shown, each of which was scheduled on two different days.

Jasper H. Kane of Brooklyn, speaker on "Terramycin" at the Tuesday evening Forum on Antibiotics. Mr. Kane was the leader of the team of scientists associated with Chas. Pfizer & Co., who discovered Terramycin.

Miss Balbina Johnson (left) and Dr. Frank L. Meleney of New York, co-discoverers of Bacitracin, who spoke at the Tuesday evening Forum on Antibiotics.

Technical and Scientific Exhibits: The alliance between industry and medicine in the development of improved means and methods of diagnosis and treatment of disease and injury was made strikingly clear in the large display of medical and surgical equipment and supplies in the Technical Exhibit. This area in the lower level of the hotel was a magnet for surgeons wishing to be well posted on the newest aids to efficient and effective surgery.

The scientific exhibits, also displayed in the Exhibit Hall, were well conceived and

instructive. They ranged in subject matter from a mobile anesthesia unit for field use, exhibited by the Sampson Air Force Base at Geneva, New York, to tabulated data from case histories on "The Surgical Cure for Hyperthyroidism" exhibited by Dr. Willard Bartlett, Jr., of St. Louis.

Operating Room Nurses' Sessions: In recognition of the dependence of the modern surgeon upon the other members of the surgical team to obtain the best results for the patient, particularly the operating room supervisors and nurses, the International College of Surgeons sponsored for the first time at a surgical meeting a series of sessions for operating room nurses. The Operating Room Nurses Section of the First District, Illinois State Nurses Association, cooperated in the planning and sponsorship, and its president, Dorothy A. Schmidt, Operating Room Supervisor, University of Chicago Clinics, presided at the five sessions.

Two hundred and seventy-eight nurses from twenty-three states attended the sessions. Among them was Edith Dee Hall, President of the Association of Operating Room Nurses, New York, who will play a leading part in the planning of the 1953 sessions for operating room nurses at the Assembly in New York next September. The attendance at the 1952 Assembly was so good and the nurses so enthusiastic about the program that these sessions will definitely be repeated next year and will become a regular feature of the annual meeting.

Star attraction of the 1952 sessions was Dr. Carl W. Walter of Boston, Senior Associate in Surgery, Peter Bent Brigham Hospital, Associate Clinical Professor of Surgery, Harvard University Medical School, and widely known authority on

Dr. Henry W. Meyerding of Rochester, Minnesota, immediate past president of the College, greets the nurses at their meeting at the Conrad Hilton Hotel; seated are Dorothy Schmidt, University of Chicago Clinics, the presiding officer, and Dr. Carl Walter of Boston.

Speakers at O.R.N. session on "Methods of Training": left to right, Edith Chambers, Instructor-Supervisor, Auxiliary Personnel, Wesley Memorial Hospital; Helen Dimschultz, formerly O.R.S., Michael Reese Hospital; Edna A. Prickett, O.R.S., Presbyterian Hospital; Lieut. Doris E. Nelson, U.S. Naval Hospital, Great Lakes; Martha Duchon, Head Nurse, Cook County Hospital; Mary Johnson, O.R.S., Augustana Hospital.

Dr. Earle H. Spaulding of Philadelphia discusses problems after the "Problem Clinic" with, left to right, Adelaide Scipioni, O.R.S., Strong Memorial Hospital, Rochester, New York; Ruby Greutman, O.R.S., Memorial Hospital, Cheyenne, Wyoming; and Mrs. James Diegert, O.R. instructor, Strong Memorial Hospital, Rochester.

aseptic technique in the operating room. Dr. Walter gave a demonstration on "The Design of a Modern Operating Room" in the large Surgical Amphitheater of the Cook County Hospital on Tuesday morning, September 2, before an overflow audience. In the afternoon, at the hotel, where all of the other sessions were held, he took part in a panel discussion on the same subject, speaking on the "Scientific Aspects." The other members of the panel were Raymond W. Garbe, Chicago, architect, Schmidt, Garden & Erikson, and F. A. Van Atta, Chicago, Director

Speakers at the Tuesday afternoon O.R.N. session: left to right, Raymond W. Garbe of Chicago, Architect, Schmidt, Garden & Erikson; Dr. Carl W. Walter, Peter Bent Brigham Hospital, Boston; and F. A. Van Atta of Chicago, Director of Industrial Hygiene, National Safety Council.

Left to right: Marian L. Fox, Nursing Specialist, American Hospital Association, moderator of the "Problem Clinics"; Edith Dee Hall, Secretary, A.O.R.N., New York; Laura G. Jackson, Coordinator of Public Relations, International College of Surgeons, who arranged the meetings; Edna A. Prickett, secretary of the O.R.N. Section, Chicago, who with the president, Dorothy A. Schmidt, helped Miss Jackson in planning the program.

(Cuts by courtesy of *Hospital Topics*)

At the nurses' meetings were, left to right, front row, Kathryn Balzer, O.R.S., White Cross Hospital, Columbus; Irene Preston, O.R.S., Newark, Ohio, Hospital; Glella Sutton, Secretary, A.O.R.N., Columbus; back row: Marie Ante, O.R.S. and Allison Myers, Assistant O.R.S., St. Luke's Hospital, Chicago; and Virginia Wilson, E.E.N.T. Supervisor, Good Samaritan Hospital, Cincinnati.

Overflow crowd in front of the tiers of seats in the surgical amphitheater for Dr. Walter's demonstration.

of Industrial Hygiene, National Safety Council. The former discussed "Architectural Aspects" and the latter "Safety."

The morning sessions on the second day consisted of the showing of films of special interest to operating room nurses and a demonstration of a new type operating room table. In the afternoon, "Methods of Training Operating Room Personnel" was the subject of a panel discussion with Edna A. Prickett, Operating Room Supervisor, Presbyterian Hospital, Chicago, as moderator. The participants discussed, respectively, training of

View of audience at Cook County Hospital on the morning of Septemb er 2 for Dr. Carl Walter's demonstration of "The Design of the Modern Operating Room." Operating room nurses packed the large surgical amphitheater.

auxiliary personnel, technicians, student nurses, staff nurses, and supervisors. In the evening a "Problem Clinic" was held with Marian L. Fox of Chicago, Nursing Specialist, American Hospital Association, as the moderator. The panel of authorities consisted of Dr. Arnold S. Jackson of Madison on "The Surgeon's Viewpoint"; Clinton F. Smith, Superintendent, Silver Cross Hospital, Joliet, Illinois, on "Hospital Administrator's Viewpoint"; Miss Prickett on "Operating Room Supervisor's Viewpoint"; and Dr. Earle H. Spaulding of Philadelphia, Professor of Microbiology and Chairman of the Department, Temple University School of Medicine, on "Bacteriologist's Viewpoint on Control of Infections in the Operating Room." The barrage of questions fired at the panel members showed the keen interest of the members of the audience in contributing their full share to the solution of operating room problems.

Mrs. Walter C. Burket

Woman's Auxiliary: At a business meeting held during the Assembly, the new President, Mrs. Walter C. Burket, gave the following message:

"On September 1, 1952, the first Board of the newly formed Woman's Auxiliary of the United States and Canadian Sections was installed. Our first official Board meeting confirmed my first impression that it would be hard to find a more gracious and intelligent group of women in any organization. I undertake the presidency of the Woman's Auxiliary with due humility, well aware how great the responsibilities it entails. I am confident, however, that with the loyal support of my very competent Board we can accomplish meritorious work.

"How great our opportunities for service are will rest directly upon the number of members in the Woman's Auxiliary. If every member of the International College of Surgeons does not support us by seeing that at least one member of his family is a member of the Woman's Auxiliary, our program of service will be seriously curtailed.

"Our aims are to further the work of the International College of Surgeons, to cultivate a spirit of friendliness, to assist in the social activities at all meetings of the College, to aid in the furnishing and maintenance of the Home and Library of the College, and to promote surgical education and research.

"All women joining before December 1, 1952, will be considered Charter Members and will receive a Charter Membership Certificate about January 1, 1953. There are no initiation fees. The annual dues are ten dollars from January 1, until the following January 1.

"Not only wives of surgeons are entitled to membership in this Auxiliary but their mothers, daughters, and sisters. We earnestly hope that every member of the International College of Surgeons will cooperate with us in building up our membership. We realize what heavy home and community responsibilities rest upon the shoulders of these educated and conscientious

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United States and Canadian Sections

THE INTERNATIONAL COLLEGE OF SURGEONS

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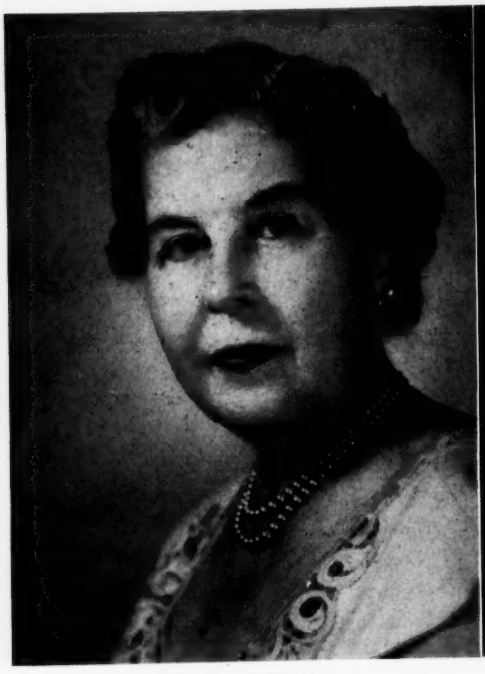


Mrs. Floyd E. Kier

Mrs. E. Karley Pinkerton

women, so it is our intention to make membership in the Woman's Auxiliary no added burden. Women may join, knowing that their dues will directly aid the work of the College and that membership implies no further obligation, unless they choose to assume an active role.

"The intelligence and goodwill represented in our membership makes our potentiality as unlimited as our opportunity for service in the world today. We ask for your wholehearted support."

On an accompanying page, the newly elected and appointed officers and board members of the Woman's Auxiliary of the United States and Canadian Sections are listed.

Women's Entertainment: The program of entertainment arranged for the wives and daughters of surgeons who were attending the Assembly was thoroughly enjoyed, to judge by the response in numbers and the expressions of appreciation On Tuesday, September 2, Mrs. Max Thorek was hostess at a welcoming tea at the Home of the College, during which one of Chicago's most distinguished shops, Madame Marguerite, presented a fashion show. On Wednesday there was a luncheon at the Kungsholm Restaurant, followed by a puppet opera, featuring the nationally famous little theater and recordings of the greatest operatic stars. On Thursday the ladies gathered for

Reception for the ladies at the home of the College on Tuesday afternoon, September 2. Left to right: Mrs. Walter C. Burket, Evanston; Lady Moyra Browne, London, England; Mrs. Donald Dickerson, Danville; Mrs. E. T. Lassitter, Albuquerque (Dr. Lovelace's sister); Mrs. Max Thorek, Mrs. Paul Egel and Mrs. Louis F. Plzak of Chicago.

Presentation of Colors at the Seventeenth Annual Convocation, United States and Canadian Sections, International College of Surgeons.

luncheon in the Wedgewood Room at Marshall Field's, and on Friday at the Art Institute. On Wednesday morning many of them attended a lecture at Madame Helen Rubenstein's salon. On other mornings buses left the hotel on sightseeing tours around the city. Mrs. Max Thorek was honorary Chairman and Mrs. Walter C. Burket was General Chairman of the Ladies' Reception and Entertainment Committee. They were assisted by 57 committee members.

Convocation: Of course the Convocation had its usual colorful aspects, providing a peak for the week's climb of events. It was held in the spacious Chicago Civic Opera House. The processional of nearly a thousand new members and Fellows was spectacular, and the conferring of thirteen Honorary Fellowships was impressive. The procession of flags of the nations, carried by nurses from a number of Chicago hospitals, conveyed graphically the feeling of surgical solidarity throughout the world. On the stage were the international officers, United States and Canadian Section officers, Regents, delegates, Consular Corps, Honorary Fellows, Canadian candidates, and guests.

There were so many highlights in the

rich and varied program that it is impossible to reach agreement upon what the main ones were—each to his taste—or specialty—was frequently the deciding factor. Yet certainly all were most deeply impressed, inspired, and charmed by the presence of a venerable and venerated British man of science—the "Pragmatic Humanist" and ardent champion of "Freedom in Medicine"—the subject which he chose for his message—the Rt. Hon. Lord Horder of London, England.

Lord Horder's Address: Elsewhere in this issue is published Lord Horder's masterly appeal to American physicians to profit by the sad experience of Britain with Government control of medicine and to fight to preserve the freedom in which medical science best flourishes and advances. Sounding the keynote and climax of the Congress, Lord Horder aroused the fighting spirit—and won the hearts—of his audience.

Besides the United States and Canadian surgeons and scientists who were received into Fellowship and membership, the 1952 Convocation class included surgeons from the following sections: Algeria, Argentina, Brazil, British West Indies, Colombia, Cuba, Egypt, England, France,

Center: The Rt. Hon. Lord Horder of London, England, who received an Honorary Fellowship at the Convocation; at his right is Dr. Elmer Henderson of Louisville, and at his left Dr. Morris Fishbein of Chicago, who sponsored him. At extreme left of the picture is Dr. Arnold Jackson of Madison, Wisconsin, President-elect; N. S. Section; in second row behind Dr. Henderson is Dr. William R. Lovelace of Albuquerque, New Mexico, President, U.S. Section; and at extreme right, Dr. Henry W. Meyerding of Rochester, Minnesota, immediate past president of U. S. Section.

Dedication of the Fred H. Albee Memorial Chair at the Convocation ceremonies.

French West Africa, Germany, Guatemala, Honduras, India, Indonesia, Iran, Iraq, Israel, Italy, Lebanon, Morocco, The Netherlands, Nicaragua, North Wales, Pakistan, Peru, Scotland, Southern Rhodesia, Thailand, and the Isle of Wight.

Fred H. Albee Memorial Chair: A solemn note was injected into the Con-

vocation with the memorial service for departed members and the dedication of the Fred H. Albee Memorial Chair in tribute to the former beloved president of the College. Participating in the dedication ceremonies was Dr. Fred H. Albee, Jr. The dedication address was given by Dr. Max Thorek, who acknowledged as follows the service and devotion of Dr. Albee to the College:

"With the passing of Dr. Fred H. Albee, a man known and beloved all over the civilized world, surgery lost one of its most brilliant and distinguished exponents and all humanity lost a friend. Dr. Albee was notable not only for his great skill and originality of surgical technic but for his largeness and generosity of mind; quick to recognize merit wherever he found it, deeply and unselfishly devoted

Dr. Fred H. Albee, Jr., son of the late Dr. Fred H. Albee, receives the Memorial Chair.

to the ideals of his profession, he had no room in his life for petty self-seeking. He was ambitious, but his ambitions were for surgery, not for fame. He became famous, so to speak, in spite of himself, and his place among great surgeons and benefactors is secure.

"Dr. Albee was fortunate in having a life companion who understood and shared his ideals and purposes and who gave him unstintedly, and throughout his career, such support and encouragement as only a true woman, a true wife and a true helpmeet can give any man. Mrs. Albee shared not only his victories and triumphs but the hardships and heartbreaks that preceded them. She receives but her due reward in the affection and homage of the world for her husband's genius, and in the fact that her son, Dr. Fred H. Albee Junior, is following in his footsteps.

"The International College of Surgeons, in its formative period, had no more devoted member than Dr. Albee, whose service to the organization he believed in knew no bounds. At whatever cost to himself of time, energy or convenience, his organizational responsibilities were fulfilled with the same completeness and conscientiousness as that which so distinguished his surgical career. His work among us can never be forgotten while we live; but no man lives forever, and some time ago I suggested that a visible and tangible memorial, which shall outlast our brief span and commemorate his worth to surgeons of the future, is surely his due. The choice has fallen, appropriately, I think, on a memorial chair de-

Dr. Alexander Brunschwig, F.A.C.S., New York, is presented for Honorary Fellowship by Dr. Harry A. Oberhelman and Dr. W. W. Babcock.

signed to suggest the dignity, wisdom, learning and power of the dedicated surgeon. This chair will grace the College Home permanently as a testament and tribute to Fred Albee and as a memento to those who knew and loved him."

Views of some of the principals in the ceremonies incident to the awarding of Honorary Fellowships are shown in accompanying photographs. The list of Honorary Fellows is here presented:

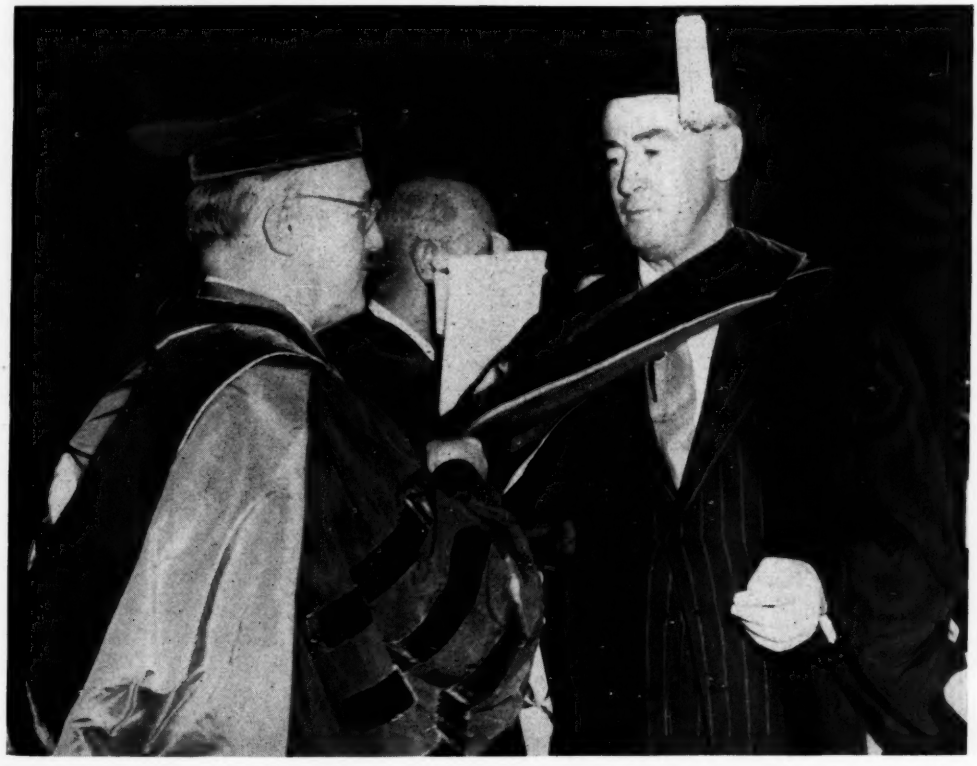
INTERNATIONAL COLLEGE OF SURGEONS HONORARY FELLOWS 1952

THE RT. HON. LORD HORDER, G.C.V.O., M.D., B.Sc., F.R.C.P. (London) Hon. M.D., Melbourne and Adelaide, London, England. Extra Physician to H.M. The Queen; Consulting Physician to St. Bartholomew's Hospital; Honorary Adviser to Ministries of Food, Labour and Pensions in H.M. Government; Chairman of British Empire Cancer Campaign; Chairman of Empire Rheumatism Council; Chairman of Fellowship for Freedom in Medicine.

Presented by Dr. Morris Fishbein, F.I.C.S. (Hon.), Chicago, Illinois, and Dr. Elmer L. Henderson, F.A.C.S., F.I.C.S. (Hon.), Louisville, Kentucky.

DENIS JOHN BROWNE, M.B., F.R.C.S. (Eng.), London, England; Surgeon, Hospital for Sick Children; Arris and Gale Lecturer, Royal College of Surgeons of England, 1934; Hunterian Professor, 1947, 1949 and 1950.

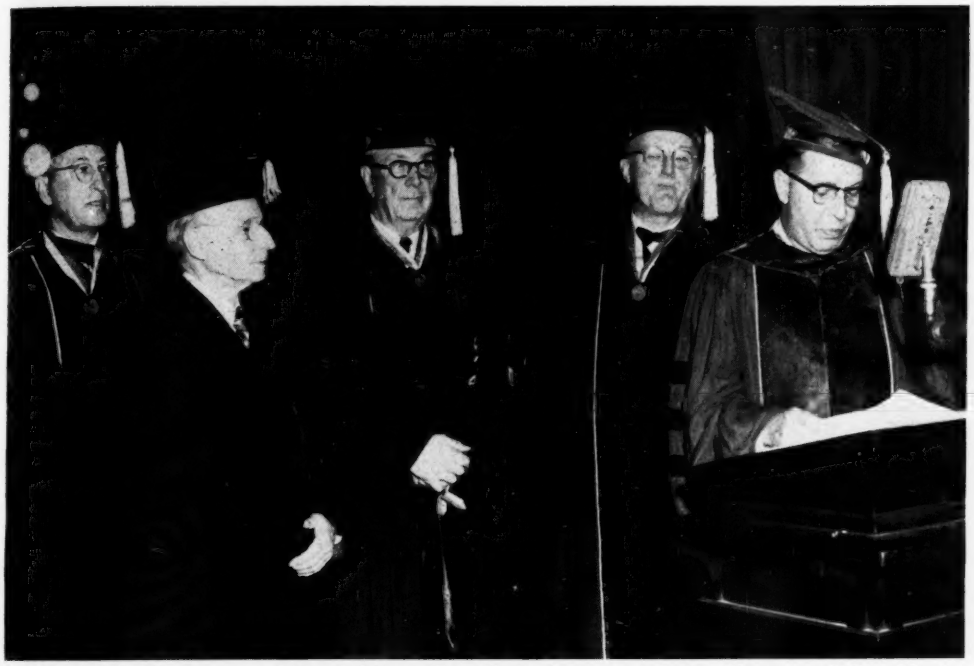
Presented by Dr. Lyon H. Appleby, F.R.C.S. (Eng.), F.R.C.S. (Can.), F.A.C.S.,



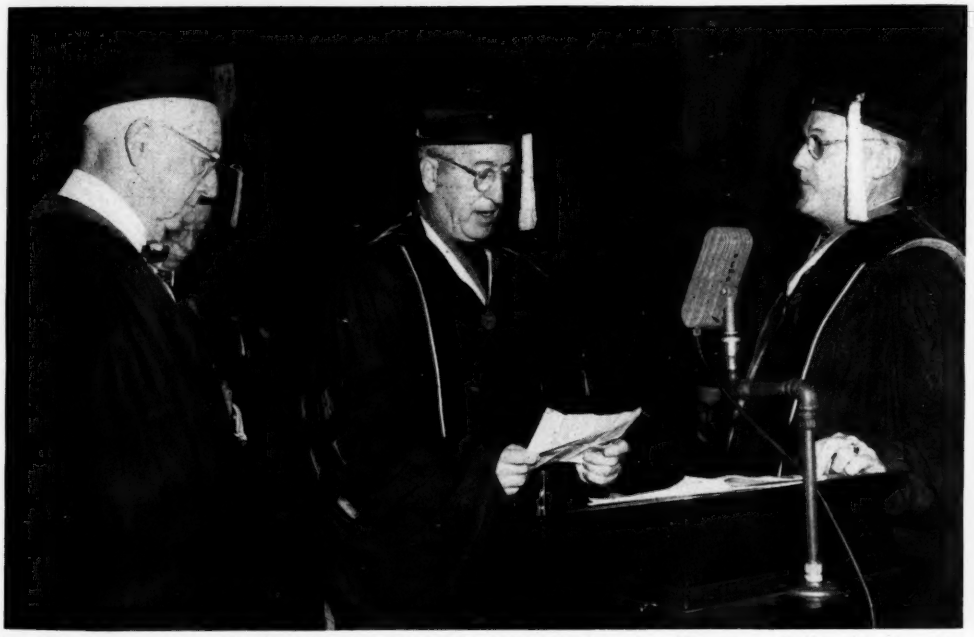
Presentation of Mr. Denis John Browne, F.R.C.S. (Eng.), of London, for Honorary Fellowship; presented by Dr. Raymond W. McNealy and Dr. Lyon H. Appleby.

Dr. Fremont A. Chandler, F.A.C.S., of Chicago, is presented for Honorary Fellowship by Dr. Edward L. Compere (center).

Dr. Francis L. Lederer, F.A.C.S., of Chicago, is presented for Honorary Fellowship by Dr. Horace E. Ayers and Dr. Matthew S. Ersner.



Dr. Benjamin M. Duggar of Pearl River, New York, is presented for Honorary Fellowship by Dr. William Randolph Lovelace and Dr. Harry E. Bacon (at the rostrum).



Dr. F. Gregory Connell of Oshkosh, Wisconsin, is presented for Honorary Fellowship by Dr. Arnold S. Jackson (center), and Dr. Claude J. Hunt.

Prof. Bernhard Zondek of Jerusalem is presented for Honorary Fellowship by Dr. Gilbert Douglas and Dr. Aaron Kanter.

F.I.C.S., Vancouver, B. C., Canada, and Raymond W. McNealy, F.A.C.S., F.I.C.S., Chicago, Ill.

D. W. GORDON MURRAY, M.B., F.R.C.S. (Eng.), F.R.C.S. (Can.), Toronto, Canada. Senior Surgeon, Toronto General Hospital; Associate Professor of Surgery, University of Toronto; Medical Director, Caven Research Foundation.

Presented by Dr. C. W. Burns, F.R.C.S. (Can.), F.A.C.S., F.I.C.S., Winnipeg, Manitoba and Dr. Karl A. Meyer, F.A.C.S., F.I.C.S., Chicago, Illinois.

ALEXANDER BRUNSCHWIG, M.S., M.D., F.A.C.S., New York, New York; Professor of Clinical Surgery, Cornell; Attending Surgeon, Memorial Hospital for the Treatment of Cancer and Allied Diseases.

Presented by Harry A. Oberhelman, F.A.C.S., F.I.C.S., Chicago, Illinois, and Dr. W. W. Babcock, F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania.

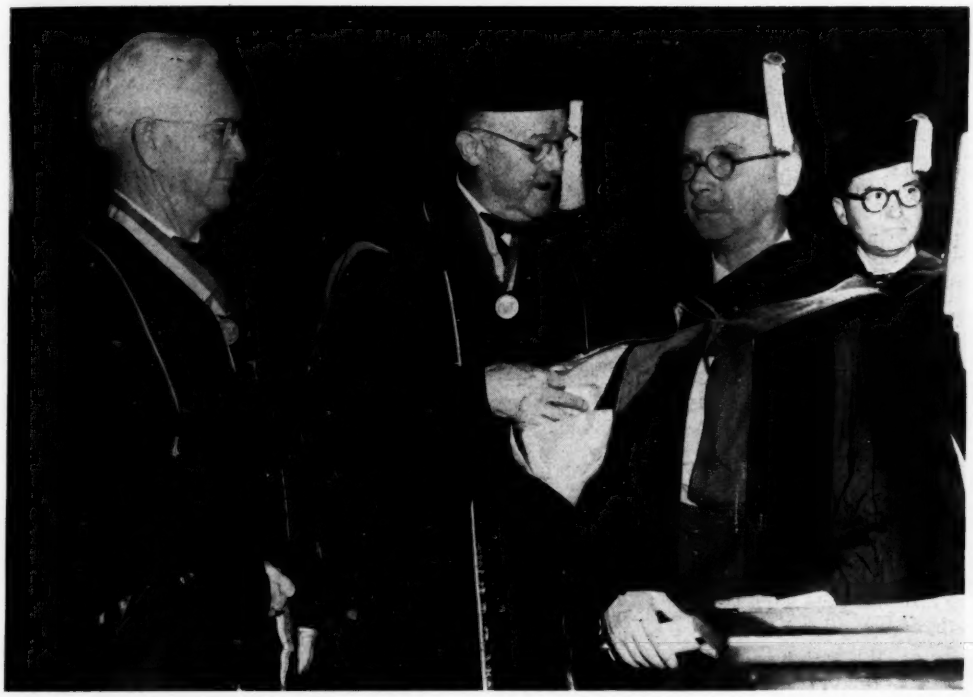
BERNHARD ZONDEK, M.D., M.D.h.c., F.I.C.S., Jerusalem, Israel. Professor of Gynecology and Obstetrics; Head of Hormone Research Laboratory, Hebrew University Hadassah Medical School, Jerusalem.

Presented by Dr. Gilbert F. Douglas, F.A.C.S., F.I.C.S., Birmingham, Alabama, and Dr. Aaron E. Kanter, F.A.C.S., F.I.C.S., Chicago, Illinois.

F. GREGORY CONNELL, M.D., F.A.C.S., Oshkosh, Wisconsin. Attending Surgeon, St. Mary's and Mercy Hospitals; Consulting Surgeon, Theda Clark Memorial Hospital, Neenah, Winnebago State Hospital, Winnebago, Wisconsin.

Presented by Dr. Arnold S. Jackson, F.A.C.S., F.I.C.S., Madison, Wisconsin, and Dr. Claude J. Hunt, F.A.C.S., F.I.C.S., Kansas City, Missouri.

NICHOLAS HAROLD LLOYD RIDLEY, M.D., M.A., M.B., B.Chir., F.R.C.S. (Eng.), London, England; Surgeon and Director, Contact Lens Department, Moorsfields, Westminster and Central Eye Hospital; Honorary Re-



Mr. Nicholas Harold Lloyd Ridley, F.R.C.S. (Eng.), of London, England, is presented for Honorary Fellowship by Dr. Otis Wolfe and Dr. Richard Perritt.

search Assistant, Wright-Fleming Institute, St. Mary's Hospital.

Presented by Dr. Otis R. Wolfe, F.I.C.S., Marshalltown, Iowa, and Dr. Richard Perritt, F.I.C.S., Chicago, Illinois.

FRANCIS L. LEDERER, B.Sc., M.D., F.A.C.S., Chicago, Illinois. Professor of Otorhinolaryngology, Head of the Department, Illinois University College of Medicine; Attending Otolaryngologist, Michael Reese, Grant, Mount Sinai and Augustana Hospitals; Chief Attending Otolaryngologist, Research and Educational Hospitals, University of Illinois; Chief of Otolaryngological Service, Illinois Eye and Ear Infirmary.

Presented by Dr. Matthew S. Ersner, F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania, and Dr. Horace Ayers, F.A.C.S., F.I.C.S., New York, New York.

WILLIAM B. CLARK, M.D., F.A.C.S., New Orleans, Louisiana. Professor of Ophthamology and Chairman, Department of Ophthalmology, Tulane and Tulane Graduate School; Chief of Tulane Eye Service and Senior Visiting Surgeon, Charity Hospital of Louisiana; Chief Surgeon, Service No. 1, and Assistant Surgeon in Charge of Eye Department, Eye, Ear, Nose and Throat Hospital; Assistant Chief Oculist, Illinois Central Hospital; Visiting Ophthalmologist, Southern Baptist Hospital.

Presented by Dr. Neal Owens, F.A.C.S., F.I.C.S., New Orleans, Louisiana, and Dr. Oscar B. Nugent, F.A.C.S., F.I.C.S., Chicago, Illinois.

THOMAS WATERMAN MOORE, M.D., F.A.C.S., Huntington, West Virginia. Surgeon, Huntington Memorial and St. Mary's Hospitals. Diplomate, American Board of Ophthalmology; Honorary Fellow American Broncho-Esophageal Society; Honorary Fellow, Southeastern College of Surgeons and American Medical Association.

Presented by Dr. Robert J. Wilkinson, F.A.C.S., F.I.C.S., Huntington, West Vir-

ginia, and Dr. Curtice Rosser, F.A.C.S., F.I.C.S., Dallas, Texas.

FRANK L. MELENEY, M.D., F.A.C.S., New York, New York; Professor of Clinical Surgery, Columbia; Attending Surgeon, Presbyterian Hospital and Vanderbilt Clinic.

Presented by Dr. William Carpenter MacCarty, Sr., F.A.C.P., F.I.C.S. (Hon.), Rochester, Minnesota, and Dr. Clement L. Martin, F.A.C.S., F.I.C.S., Chicago, Illinois.

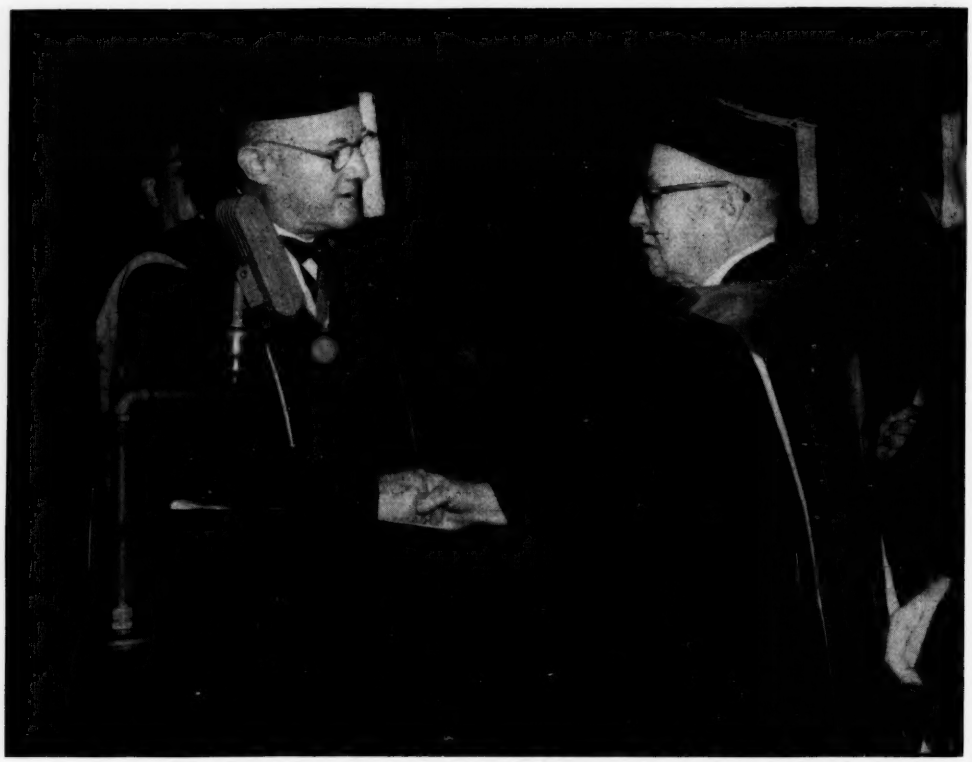
BENJAMIN M. DUGGAR, B.S., M.S., Ph.D., LL.D., Consultant in Mycological Research and Production, Lederle Laboratory Division, American Cyanamid Company, Pearl River, New York.

Presented by Dr. Harry E. Bacon, F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania, and Dr. William Randolph Lovelace, F.I.C.S., Albuquerque, New Mexico.

FREMONT A. CHANDLER, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois; Professor of Orthopedic Surgery, University of Illinois School of Medicine; Senior Attending Orthopedic Surgeon, St. Luke's Hospital.

Presented by Dr. Edward L. Compere, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois.

Banquet Address.—The banquet speaker, Mr. Denis John Browne, also of London, likewise expounded, though in lighter vein, the dangers of mixing politics and medicine. Celebrated for his wit, broad learning and polished delivery, as well as for his skill as a surgeon, Mr. Browne enthralled the largest banquet audience in the history of the International College of Surgeons. There was scarcely room to pass between the tables, so closely were they packed in the enormous Grand



Presentation of Dr. Thomas Waterman Moore, F.A.C.S., of Huntington, West Virginia, for Honorary Fellowship. Dr. Moore is being congratulated by Dr. Henry W. Meyerding, immediate past president of the U. S. Section.

Ballroom of the hotel. It was a brilliant setting, a brilliant assemblage, a brilliant speaker, and a brilliant group of distinguished guests at the head table who were introduced by Dr. Max Thorek. The presiding officer was Dr. Raymond W. McNealy, the General Chairman of the Assembly.

Summary: The outstanding success of the 1952 Assembly was due to the hard work and coordinated efforts of a great number of individuals. Space prevents listing them all, but particular recognition is due to the following committees and individual participants:

Chairman of Assembly:
RAYMOND W. MCNEALY, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois

Co-Chairmen:
KARL A. MEYER, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
MAX THOREK, M.D., LL.D., D.Sc., F.I.C.S., F.B.C.S., D.C.M., Chicago, Illinois

Banquet:
CHESTER W. TROWBRIDGE, M.D., F.A.C.S., F.I.C.S., Oak Park, Illinois, *Chairman*
CLAIR M. CAREY, M.D., F.A.C.S., F.I.C.S., Oak Park, Illinois
DONALD L. DICKERSON, M.D., F.I.C.S., Danville, Illinois

Benediction at the Convocation.

LOUIS F. PLZAK, M.D., F.A.C.S., F.I.C.S., Berwyn, Illinois
WILLARD J. BERWANGER, M.D., F.A.C.S., F.I.C.S., Glen Ellyn, Illinois

Convocation:
CLEMENT L. MARTIN, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois, *Chairman*
HARRY A. OBERHELMAN, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois, *Co-Chairman*
FRANCIS D. WOLFE, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois, *Co-Chairman*
CLAIR M. CAREY, M.D., F.A.C.S., F.I.C.S., Oak Park, Illinois, *Co-Chairman*
WALTER C. BURKET, M.D., F.I.C.S., Evanston, Illinois
CLAIRE E. CARR, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
HORACE F. TURNER, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
LOUIS F. PLZAK, M.D., F.A.C.S., F.I.C.S., Berwyn, Illinois
Pageantry:
ERNEST F. PURCELL, M.D., F.I.C.S., Trenton, New Jersey

Motion Picture Program:
PHILIP THOREK, M.D., F.A.C.S., F.I.C.S., *Chairman*
ARKELL M. VAUGHN, M.D., F.A.C.S., F.I.C.S.
JEROME J. MOSES, M.D., F.I.C.S.
ADOLPH M. MALLER, M.D., F.I.C.S.

Scientific Program:
ARNOLD S. JACKSON, M.D., F.A.C.S., F.I.C.S., *Chairman*, Madison, Wisconsin
EDWARD L. COMPERE, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
NEAL OWENS, M.D., F.A.C.S., F.I.C.S., New Orleans, Louisiana
MATTHEW S. ERSNER, M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania
EDMUND B. SPAETH, M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania
M. LEOPOLD BRODNY, M.D., F.A.C.S., F.I.C.S., Boston, Massachusetts
GILBERT F. DOUGLAS, M.D., F.A.C.S., F.I.C.S., Birmingham, Alabama
CHESTER C. GUY, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
WILLIAM E. KREWSON, M.D., F.A.C.S., F.I.C.S., Philadelphia, Pennsylvania
HENRY M. SCHEER, M.D., F.A.C.S., F.I.C.S., New York, New York
WILLIAM A. BARRETT, M.D., F.A.C.S., F.I.C.S., Pittsburgh, Pennsylvania
CYRIL K. CHURCH, M.D., F.I.C.S., New York, New York
ALFRED H. WHITTAKER, M.D., F.A.C.S., F.I.C.S., Detroit, Michigan
AUGUST F. DARO, M.D., F.I.C.S., Chicago Illinois
CLAIR M. CAREY, M.D., F.A.C.S., F.I.C.S., Oak Park, Illinois

Registration Committee:
Chairman:
HORACE E. TURNER, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois

Public Relations Committee:
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LOUIS F. PLZAK, M.D., F.A.C.S., F.I.C.S., Berwyn, Illinois

Housing Committee:
Chairman:
HORACE E. TURNER, M. D., F.A.C.S., F.I.C.S., Chicago, Illinois
KURT L. EICHELBAUM, M.D., F.I.C.S., Chicago, Illinois
WILLIAM F. LAUTEN, M.D., F.I.C.S., Chicago, Illinois
DONALD S. MILLER, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois
LOUIS P. RIVERS, M.D., F.A.C.S., F.I.C.S., Oak Park, Illinois
ALFONS R. BACON, M.D., F.A.C.S., F.I.C.S., Chicago, Illinois

Dr. Walter C. Burket, Chairman, and the other 46 members of the Reception Committee also are to be commended for the success of their efforts to create a cordial atmosphere. Others who should be specially mentioned are the members of the Committee on Scientific Motion Pictures—Drs. Philip Thorek, Arkell M. Vaughn, Jerome J. Moses, and Adolph M. Maller; the Committee on Scientific Exhibits—Drs. William Carpenter MacCarty, Sr., Claude J. Hunt, Arnold S. Jackson, and Morris Weintrob, and Mr. Harold R. Heberlein. The Technical Exhibit owed a large measure of its success to Mr. William J. Burns, Director of Exhibits.

Seventeenth Annual Banquet of the United States and Canada Sections at the Conrad Hilton Hotel on Thursday evening,

United States and Canada Sections at the Conrad Hilton Hotel on Thursday evening,

ay evening, September 4.

Convocation Address
Freedom in Medicine

THE RT. HON. LORD HORDER, G.C.V.O., M.D., B.Sc., F.R.C.P. (London),
HON. M.D., MELBOURNE and ADELAIDE
LONDON, ENGLAND

MY immediate and distinguished predecessor in the very honorable task which has been allotted to me tonight was given as his subject: "America of Tomorrow." Those of you who were present remember how Senator Kefauver developed his theme. He began by reminding you that America has become the leader of the nations "who are devoted to a free and democratic way of life, . . . nations which respect the dignity of man."

He then pointed out that it was no longer by power alone—physical power—that this challenge to leadership must be accepted, but also by working "through men's minds and imagination."

Coming, next, to the sphere in which his hearers were specially concerned, the Senator affirmed that America had kept free the fields of science and medicine and, as the result of so doing, American medicine had made a big contribution to its foreign relations. This he illustrated by reference to the work of the Economic Cooperation Administration and the World Health Organization, which he considered to be "one of mankind's most stupendous efforts . . . to put into practice the ideals of brotherhood and faith in the fundamental goodness of human beings."

Senator Kefauver's next sentence must have given most of you much satisfaction. Said he, "The fact that American doctors, free of government domination and secure in the traditional doctor-patient relationship, have led the world in these health developments, should be the answer to those critics who seek to destroy *our* kind of system through a system of socialized medicine."

As a statement of faith on the part of one of your prominent politicians that was, of course, excellent. But I wish I could free my mind of the thought that the argument, as presented, contained a large element of what the logicians call the *"non sequitur."*

You remember the lines in the Pious Editor's creed:

"I du believe in Freedom's cause
Ez fur away ez Payris is."

It is a weakness of our nature, both individual and national, to wish upon others, policies and principles which we hesitate to adopt ourselves. If you read, in conjunction with this reflection of mine, Herbert Spencer's corollary to the cliché—whether originally Curran's or Lincoln's or whose—about the price of liberty being eternal vigilance, viz., that "It is far less against foreign aggression against liberty that this vigilance is required than against the insidious growth of domestic interference with personal liberty"—if, I say, you add this reflection and this corollary to the Senator's statement of faith, you may count me as being amongst those who believe with him that "the America of tomorrow" will be a nation in which "our freedoms—and our sense of the individual man will be safe and secure."

Very good; so much for the agreed Article of Faith in general. But what of its operation on the Home Front? For it is that with which I am concerned this evening.

"Democratizing social change is the order of the day. The organization of Health Services is one part of the movement . . . a very important part, because medical care is so intimate a need of everyone." (M. I. Roemer.) And so, whether you look at it from the angle of the State, as expressed in the old saying: "A nation's greatest asset is the

health of its citizens"; or from the angle of the individual, with whom both the cost of living and the cost of doctoring are rocketing, the pressure upon the politician to do something about it is almost irresistible.

Witness President Truman's now historic "Point IV." You remember how it ran: "Now that we have the medical knowledge that can bring good health within our reach to a degree heretofore undreamed of, we must improve the means for putting that knowledge to practical use . . .; to see that our people actually enjoy the good health that medical science knows how to provide is one of the great challenges to democracy."

As I said at Atlantic City three years ago, it doesn't really matter whether the Presidential message was an expression of the Messiah-complex or of political expediency. What matters is that it caught the popular imagination and that many of your citizens have tuned in to the idea and may, at any time now, ask for some practical fulfillment of the implied promise.

There was nothing really new in this inaugural message of the President. At Hot Springs and at Quebec the slogan had been anticipated and it has been repeated many times since. Well, there is no reason whatever why meetings of the medical organizations of the United Nations should not open with a few verses from the Sermon on the Mount, for, after all, Medicine was made for Man, not Man for Medicine.

It is when you come to *implement* these good intentions that wisdom and foresight are needed.

In July, 1948, medical care was nationalized or, as you term it here, "socialized," in Great Britain. Many friends of mine in this country know that I considered the plan upon which our National Health Service was based lacked both of these fundamentals, and that, as the result, it would largely fail, as, indeed, it has done. This being so, I might be reasonably accused of bias if I gave you my own summary of the view of my colleagues at home on the operation of the Service. Let me rather choose the conclusions of one of your own observers—Dr. Stanley Dorst, Dean of the College of Medicine in the University of Cincinnati.

"What," asks Dr. Dorst, "do the thoughtful, intelligent members of the British medical profession think about this system under which they must work? . . . In the first place, they understand clearly the social and economic matrix out of which the present political pattern developed. They know that nationalization of the people's efforts is basically a response to a grave economic emergency. They waste little time defining the National Health Service Act as a great achievement in social advancement but instead most of the physicians recognize it as part of a rather desperate effort to avert social and economic catastrophe. Because they understand this, the large majority of the medical profession are trying to make the system work even though frustration and disillusionment may be their personal lot. And it *is* working today, neither because the program was wisely conceived nor effectively executed, but because doctors are doctors and take care of the sick, regardless of circumstances, when the cards are down.

There is almost universal agreement among physicians that the hospitals under existing economic conditions must be subsidized by the State. But there is much anxiety expressed because the government has taken over complete ownership as its method of providing subsidy. There is agreement that the medical schools must have greatly increased support from public monies and that this tax support has been wisely administered. There is universal *dis*agreement with the revolutionary method by which the Act was put into operation. It is remembered that the Beveridge Plan allowed from five to 10 years to accomplish by gradual stages what was done at midnight on a certain date as an act of power. There is little sympathy for that part of the Act which places the whole medical profession on the payroll of the government and has

led to the deterioration of general practice. This, they believe, was not necessary.

"Finally," says Dr. Dorst, "I must answer the question which my friends invariably bring out as the argument designed to annihilate any unfavorable criticism of British Medicine. 'Is it not true,' they say, 'that more people are receiving medical care than ever before?' Let me substitute the words 'medical *attention*' for 'medical *care*' and the answer is an unequivocal—yes! But if you are interested in medical *care*, the early diagnosis of disease and its adequate management—the answer is just as emphatically—no!

"A type of medical attention in which unbelievable abuse of the doctor and the hospital are inextricably mixed with real medical need is producing a technique of medical practice which must lead to professional disintegration. That is the result of nationalized medicine as I see it in Britain today."

Dr. Dorst then reviews the situation from a wider and more philosophical angle. "My friends reply," he says, "that they realize—Britain has gone too far; (but) there are many good things in the program, and they wish to carry over only the good things and incorporate them into American medicine. When these good meaning people talk in this manner they astonish and frighten me . . . more than they would if they frankly advocated nationalized medicine with all its trimmings. . . . They do not understand the fundamental nature of Socialism in either theory or practice. The idea of a self-limiting or temporary collectivism is too absurd for serious discussion. It is opposed to the historical record of every attempt at limited collectivism by a major nation. . . . It is contrary to the essential nature of statism. Quoting from the wisdom of Dr. Dooley, 'when one can fall out of a twenty story window and stop comfortably at the tenth . . .'—then I will seriously consider the possibility of a limited collectivism.

"Much remains to be done in this country," says Dr. Dorst in conclusion, "to improve the quality of medical care in certain areas and to work out a more equitable distribution of doctors and of hospital facilities. I do not believe that the English experiment with nationalized medicine provides the answer to our problems. Fortunately, economic pressures have not faced us with Britain's dilemma. We have the time and we have the intelligence to solve our problems by evolutionary methods and thus avoid the inevitable centralization of power masked under the pleasant sounding name of the Welfare State."

To which I add the fervent prayer, God grant that it may be so.

Dr. Dorst's masterly summary was put on record in April, 1950. The two and a half years that have passed since then have confirmed in all respect his estimate of the reactions of my colleagues at home to the Act of July, 1948. They have also proved the truth of his predictions.

What now? We have arrived at the stage which I myself predicted in a speech in the House of Lords in October, 1946. I said: "We are about to embark upon a great experiment in the nation's medical services, an experiment in which the State takes a much greater part than it has ever done. I conceive it to be the doctor's duty to do his utmost to make the experiment succeed. It will fall to him, in the main, to use this instrument in the best interests of the public, but there is, for the doctor, an over-riding duty—his duty to his patient. If he can fulfill this paramount duty through this means, he will, but if he cannot it will be for the patient, i.e., the public, to decide how long the sacrifice of efficiency shall continue."

That the experiment has largely failed and that the standard of efficiency in medical care has been lowered I have no more doubt than has your own countryman. You live in a land which is the home of pragmatism; the experiment has not "worked." Why did it fail?

First: Precipitancy threatened its success from the start. Such was the haste to begin the new scheme on the "appointed day" that terms of service were not even settled on between the doctors

and the State. Precipitancy: the promise of the quack—the quack in public affairs no less than the quack in medicine. Said Herbert Spencer, 100 years ago, "Injurious it must be for Society to destroy its old traditions before the new have become organized enough to take their places." Said Francis Bacon, 500 years ago, "It were good that men in their innovations would follow the example of Time itself: which indeed innovates greatly but quickly, and by degrees." Said Hippocrates, 2,000 years ago, "It is disgraceful in every art, and especially in Medicine, to make much ado, create a great spectacle, indulge in much talk and then accomplish nothing."

In the National Health Service, too much was attempted in too short a time. We doctors pleaded for progress by evolution rather than by revolution; we pleaded in vain. Had two steps been taken, and then a pause made to look around and consider the next, the present disaster might have been averted.

These two steps might have been the regionalization (and consequent rationalization) of the hospitals, with grants-in-aid administered locally; and the addition of the dependents of the workers to the National Health Insurance Service, which had already been in operation since 1911.

Second: The new scheme was based primarily upon the hospital and not upon the family physician—the G. P., as we call him for short in my country. The planners forgot the dictum of Sir George Newman, himself a Ministry of Health official, that "The foundation of a medical service is the G. P. If he is competent it is the first surety of success; if he is ineffective or ill-equipped, it must fail." The public was led to believe that the hospital was the apotheosis of medical care, whereas there is, of course, no *apotheosis* of medical care. There is a *synthesis* of medical care, which is the integration of the several functions of the family physician, the hospital and the consultant-specialist group. This integration is a natural process and can only be brought about by developments within the profession; it cannot be dictated by the State.

The baits dangled before the G. P. were most attractive. No longer was he to work in isolation. "Health centres" were to be provided and group practice was to be encouraged. Facilities for post-graduate instruction were to be increased. What has actually happened? The very opposite of all this. The G. P. finds himself to a large degree side-tracked. He is today a "filter" (the word has actually been used in official reports), a sieve with a very large mesh. He spends much of his time signing forms (they have been estimated at several scores) by which he unloads his patients upon institutions and specialists who know little of the early history of their diseases and nothing at all of their domestic conditions. No "health centres" have, as yet, after four years, been set up. There is much less post-graduate instruction than there was five years ago. More serious still, the "close-up" between doctor and patient, which we had learned to be the *sine qua non* of medical care, has been grossly interrupted. Less and less do they see of each other, whether in the home, in the doctor's office, or in the hospital.

The situation reminds me of an incident during World War I, when the late Sir Almroth Wright was asked by the Director-General how the Army Medical Service was going. "It doesn't go," said Sir Almroth. "Why, how's that?" said the Director-General. "Well," said Sir Almroth, "you send all the doctors to France and you bring all the wounded soldiers home; so they never meet." Many of the so-called "cottage," or G. P., hospitals have been closed to the family doctor, so that he can no longer follow his patient into the wards, take his part in the diagnosis and treatement while there, and resume his oversight when the patient returns home.

This segregation of the G. P. from his specialist colleagues has alarmed even the Ministry of Health itself, for in a report issued for the year ended March 31 last year, this paragraph appears:

"The Service has tended to accentuate

the division of the profession into specialists and general practitioners in the process of developing the hospitals; and it would be dangerous if the division were rigidly maintained or the intellectual contacts of the two branches of the profession were diminished."

Third: The third cause of dissatisfaction with the national Health Service has been the inadequate representation of doctors on the key Boards and Committees. The Minister's powers in this respect, as in many others, are almost unlimited, and they have been exercised in such a way that more and more laymen, nominated, and not elected, are in control of medical care.

Fourth: On the economic side the planning (save the mark!) would have put any business concern out of action at its first annual general meeting. Some of my friends tell me that, in a constitutional sense, the State can never go bankrupt. Be this as it may, the State has been quite unable to stand up to the fantastic disparity between budget and expenditure, a disparity of over 60 per cent in the first year. Much more "welfare" was embarked upon than the country could possibly pay for and the National Health Service is today splitting upon the rock of economics. A ceiling has now been imposed; the citizen has to pay 50 per cent of the dentures, spectacles, wigs, etc., which were formerly supplied "free."

It is easy to turn the tap of spending on; it is difficult to turn it off. Indeed, in turning it off there is inevitably an element of still further uneconomy, a fact which, my time being limited, I leave to your acumen to consider.

There is a big overlap of the economic aspect of Britain's National Health Service and the work of the G.P. Every case which the doctor refers to the State hospital, when he could himself diagnose and treat it, either in his own office or at the patient's home, costs the country more money. Actually, under our National Health Service, no less than 80 per cent of the total cost of medical care is absorbed by the hospitals. Add the fact of the long waiting lists at the hospitals, of both out and in patients, and the consequent absenteeism involved, and the expense of short circuiting the G.P. and his normal function becomes obvious.

These are some of the causes of the lack of success of Britain's experiment in Nationalized Medicine. It was not difficult to predict that domination of Medicine by the State would lead to other disasters than those I have mentioned. The denigration of the work of the G. P. has sapped this most important branch of practice of its spirit of initiative and adventure. The young aspirant has therefore been more and more attracted to the specialist and consultant branches, encouraged thereto still further by subsidies and by a spurious promise that they were in training for permanent jobs in these fields. Nemesis has caught them: the permanent jobs were a mirage and, when the economic axe began to fall, some 500 or 600 of the specialist trainees were dismissed from their posts in mid-career and recommended (believe it or not) for service with the fighting forces.

You will be thinking that I have painted a gloomy picture. I have; but it is a true one. I have but expanded what Dr. Dorst has already told you. For a while Medicine has, in England, lost its Freedom and Freedom is the breath of Medicine's nostrils. I must not stay to tell you how we can—and shall—recover it. I am here in Chicago to express the fervent hope that you in your country will not lose your Freedom. Yes, and if I may, I am here to give you some hints toward that end, that you may not sell your birthright. It is said that young men see visions and old men dream dreams. An old man—no, I like the new word better, an *"ageing"* man, may claim another privilege, since "ripeness is all"; he may give warnings. This I have done. Can you avoid the blunder we have made in England? I think you can. But not by apathy, still less by dissension and least of all by personal animus.

Dare I give you a few hints? In the first place, put not your faith in politicians, of whatever party. Stability is not with them, nor even tradition. Politicians come and politicians go but Medicine goes on forever. The first are ephemeral; the last is eternal. Medicine is *your* trust, not theirs. It is not safe in their hands. See that you preserve it.

Secondly, strive for unity in your own ranks. The doctors' disunity is the politicians' opportunity. Having defined your cause clearly, close up your ranks and face any enemy that may come with a broad and solid front.

Thirdly, explain things clearly to the public, i.e., to the patient, and carry the public with you. The cause is the public's cause, even more than it is yours.

And lastly, consider if your own house is in order. Think if you could not *simplify* medical care in the patient's interest and in the interest of the nation. Simplification would spell less expense, and this is clearly the bogey frightening the public and encouraging the politician to interfere. Is it *really* necessary that, at every check-up, the whole of the patient should be put on the conveyor belt? Would not a big part of the answer to the problem lie in a return to clinical medicine, with supplementary pathological and radiological data in selected cases? I wonder.

But if the citizen falls for the lure of the "Welfare State" you may not be able to save him. But at least don't push him into it. You may, by urging the importance of the individual case to the doctor, induce him more readily to believe in the value of the individual to Society. You may be able to convince him that:

"As the power of the State grows the energy of the spirit dwindles; and if ever the activity of the State should extend through and through to every department of life, the universal ease and comfort that may thus be disseminated throughout Society will have been purchased dearly at the price of the soul. The denizens of that city will be fed, housed and clothed to perfection; only—and it is a serious drawback—they will be dead." (G. Lowes Dickinson).

W. H. Hudson, in his account of ancient Peru, says that:

"In that State every man did as he was told; worked and rested, got up and sat down, ate, drank, and slept, married, grew old and died in the precise way prescribed. And I daresay if he tried to be original or to do something out of the common he was knocked on the head."

It is said that when Lenin had prepared his final draft of his proposed Bolshevik State he took it to a wise old hermit in whose judgment he had much confidence. He asked the old man if he thought the plan could be carried out in Russia. "Leave it with me," said the wiseacre, "and come again tomorrow." Lenin came the next day. "Yes," said the old man, "you can do all this in Russia, but—no one will want to live there."

May I close by once more plagiarizing myself? Your country is a country of infinite capacity and of infinite ingenuity; let it not be said that you are also a country of infinite credulity."

Editorial

The Tide Rises

"I am a part of all that I have met", says Tennyson's great Ulysses; a simple statement and so often quoted that it seems, at the first glance, a trite one. Yet, like many other simple things, it carries within it a profound and unalterable truth. We are all parts of all that we have met, and just in proportion to the experiences we select we may expect our knowledge and wisdom to grow. True, we cannot select all of life, but we have broad areas of freedom. No man can forbid us to choose between solitude and companionship, avarice and generosity, safety and adventure, a vegetative life or one filled with purposeful action. Nor can any man deny us the right and privilege of sharing with others the fruits of our experience.

When first the light of science broke over the world, the scientist could not share; he must keep his secrets or loose his life or his reason. Yet even then the impulse to share was strong. Little groups of two or three inevitably came together, drawn by an impulse more potent than fear. To learn is exciting; to share what one learns, and to take of others what they are willing to teach us, means more than we often find leisure to ponder upon, but the urgent desire is a drive that is never lessened. By a natural process of growth and evolution, those early huddles of two or three kindred minds have grown into organized groups that cover the world.

Such a group, essentially, is the International College of Surgeons. In selecting our experience from the areas of choice, we chose both professionally and personally to range over as broad a field as possible. We were early aware of the need of international acquaintance beyond the casual level, and have realized from the beginning that we could help to fill that need.

That we have done so is an open secret. Two great recent Congresses of the College, the Eighth International Congress in Madrid and the Seventeenth Annual Congress of the United States and Canadian Sections in Chicago, exceeded our highest hopes for enthusiasm and value. The frequent regional meetings in our own country, as well as the regular and special section meeting all over the world, give every evidence that the great idea behind the College is working toward fulfillment. Among the recent and highly successful regional meetings in the United States were the meeting at Birmingham, Alabama, in February, with Dr. Paul W. Shannon as chairman; the meeting in March at Pittsburgh under the chairmanship of Dr. Elmer A. S. King; the April meeting at Kansas City, Missouri, with Dr. Claude J. Hunt occupying the chair; the Colorado Springs meeting in May, under the chairmanship of Dr. Kenneth Sawyer, and the Tulsa meeting in October, presided over by Dr. André B. Carney. In addition, a meeting of the New York Surgical Section was held on November 6.

Regional meetings for 1953 are scheduled as follows: February 5 to 7, in Dallas, Texas (Dr. Curtice Rosser, chairman); February 13 and 14, in Philadelphia (Dr. Moses Behrend); March 31-April 2, in St. Louis (Dr. Roland Klemme); and May 6, in Chicago (Dr. Karl A. Meyer). Two other meetings, one in the western part of the country and one in the southern area, are being planned.

On the international level the prospect is more than bright. The Ninth International Congress will be held by special

invitation in São Paulo, Brazil, in 1954, and plans to make it an outstanding event are already well in hand. Meanwhile, in 1953, the Second Annual Congress of the Brazilian Section is expected to attract many visitors from other lands. This meeting is coincidental with the centennial celebration of the founding of Parana and will be held in Curitiba, Brazil.

We have had our vicissitudes; we expected them. No high endeavor has ever reached harbor without them. But we find a great truth in the words of Thomas Macaulay: "A single breaker may recede, but the tide is evidently coming in." It has come in so far, indeed, that the idea of the world's ever going back to isolative practices in medicine and surgery is an absurdity. To this extent our purpose has been accomplished. We know full well, however, that the task is not done. It is a law of the dynamics of science that every goal achieved is a starting point for a new one. We have our new goals, many them, before us. We know now, beyond any possible doubt, that they can be achieved. We know too that we can achieve them, with patience and time. We look forward to many more Congresses in the years to come, each of them more satisfying than the last—augmented in numbers, enriched by experience, cemented by good will and friendship and inspired, as all of them have been from the beginning, to bring into fullest reality the noble concept that science has no country but the world.

MAX THOREK

If we trace the history of the microscope to its earliest period, we travel back even further than five hundred years . . . Pliny, the great Roman naturalist, who was interested in everything and wrote upon almost every subject, was familiar with lenses, particularly burning-glasses, which the old Roman physicians used as cauteries. Pliny was so intensely interested in the eruption of Mount Vesuvius that his curiosity led him to leave his boat in the Bay of Naples and go ashore the better to study the phenomenon. The flood of lava and ashes which destroyed and buried Pompeii overwhelmed the unfortunate Pliny. The philosopher Seneca, a contemporary of Pliny and, like Pliny, an adherent of the Stoics, wrote that "letters, however small and dim, are comparatively large and distinct when seen through a glass globe filled with water." Thus the family tree of the microscope extends back at least to the first century of the Christian era.

—*Ralph H. Major*

Section News

International College of Surgeons

United States and Canadian Sections

Karl A. Meyer, M.D., F.A.C.S., F.I.C.S., Secretary

Austrian Section: Professor Dr. Andreas Plenk, F.I.C.S., of Vienna, was honored on his sixtieth birthday by a lengthy biographical article in the *Vienna Medical Weekly Journal.* In 1947 Dr. Plenk was President of the Medical Association of Austria. Dr. Plenk is a specialist in abdominal and thoracic surgery and is well known to many American surgeons who have visited his classes at the University of Vienna and his clinics at the University Hospital. He has written some forty scientific works about problems of surgery and has been particularly active in the fight against cancer.

Brazilian Section Holds Courses: Doctors who attended the "Curso de Cirugia de Varizes" in Santos, Brazil, received diplomas at an impressive session on August 20 in the headquarters of the Medical Association of Santos. The course was taught by Professor Dr. Mario Degni, F.I.C.S., and was supported by the Brazilian Section and held under the auspices of the Regional of Santos. The following doctors received the diplomas:

Antonio Ablas Filho
Antonio C. Pontes
Antonio Luiz Moreira
Antonio S. Reixeira
Aloysio R. Mendonça
Arcy Rodrigues Martins
Arthur Domingues Pinto
Avelino da Paz Vieira
Carlos Moreira Gomes
Carlos Ribeiro Gomes
Oswaldo S. Antiago
Domingos Tringali
Drausio Canellas
Edgard F. Navarro
Eduardo Dias Coelho
Eugenio Sadocco
Flavio de Gamargo
Gino F. A. Sarti
Ilzo del Mugnaio Vianna
Jayme Melchert de Castro
Jarbas Gomes da Cunha
Joao Carlos de Azevedo
Armando de O. Filho
Jose Bahia Gomes
Marcilio Dias Ferraz
Luiz da Motta Couceiro
Milton Macedo Soares
Pedro Alcover de Moura
Rinaldo de Azevedo Fº.
Sebastião F. da Rocha
Sylvio Guerra
Victor V. Fernandes
Wlademir do Amaral
Jorge Machado.

Dr. Carlos Moreira Gomes, President of the Regional of Santos, and Prof. Dr. Mario Degni, representing the Brazilian Section, spoke at the ceremonies. Dr. Degni showed two films: "Aneurismo Plastia do Segmento intra-Pericardico da Horta" and "Reparacao de Traquea pela Tecnica de Gebauer."

Oklahoma Regional Meeting: Over one hundred surgeons from Oklahoma and surrounding states attended the Regional Meeting on October 17 held at the Tulsa Hotel in Tulsa.

Dr. Ralph McGill presided at the morning session and Dr. A. Ray Wiley presided at the afternoon session. Speakers at the morning session were: Drs. Arnold S. Jackson, Madison, Wisconsin; Leslie V. Rush, Meridian, Mississippi; Curtice Rosser, Dallas, Texas; and W. P. Callahan, Wichita, Kansas.

Speakers on the afternoon program were: Drs. Willard Bartlett, Jr., St. Louis, Missouri; Forrest M. Lingenfelter, Oklahoma City, Oklahoma; Claude J. Hunt, Kansas City, Missouri; Lawrence W. Long, Jackson, Mississippi; Leo J. Starry, Oklahoma City, Oklahoma; and Neil W. Woodward, Oklahoma City, Oklahoma.

At a dinner meeting at which Dr. John E. McDonald presided, Dr. Philip Thorek of Chicago spoke on surgery of the oesophagus.

Regional Meeting in Philadelphia: A regional meeting for eastern states of the United States Section of the International College of Surgeons will be held in Philadelphia on February 13 and 14 at the Bellevue-Stratford Hotel. Dr. W. Wayne Babcock is Honorary Chairman, Dr. Moses Behrend is Chairman, and Dr. Albert Behrend is Co-chairman. Other members of the committee on arrangements are Drs. Harry E. Bacon, Matthew Ersner, Temple Fay, E. B. Spaeth, Chevalier L. Jackson, Henry S. Ruth, Camille Stamm, L. E. McCrea, William Bates, and Charles P. Bailey.

Alabama Surgical Division Meeting: The Alabama Surgical Division of the United States Section held its fifth annual assembly on October 9 in Monegomery, in cooperation with the Montgomery County Medical Society and the Alabama Academy of General Practice. An outline of the program was published in the October issue of this Journal. The President of the Alabama Surgical Division, Dr. John A. Martin of Montgomery, is also a Vice-Regent of the United States Section.

Texas Surgical Division: James T. Mills, M.D., D.A.B.P.S., F.I.C.S., of Dallas, is President of the American Society of Plastic and Reconstructive Surgery for 1952-53. The Society will hold its twenty-second annual meeting at the Hotel del Coronado, Coronado, California, November 1-6, 1953.

Wisconsin Division Meeting: On October 5 a dinner meeting of the Wisconsin Division of the International College of Surgeons was held at the Schroeder Hotel, Milwaukee, with about 25 members attending. Dr. Arnold S. Jackson of Madison spoke on his past two European trips, during which he attended international meetings of the College. The President of the Wisconsin Surgical Division, Dr. Samuel Higgins, presided. The Secretary, Dr. John Sprague, gave a resume of the past year's activities and announced that the Division has 65 members. Doctors Higgins and Sprague were re-elected to their respective offices.

Quebec Hospitals Honor Doctor MacEachern: On June 24, Dr. Malcolm T. MacEachern of Chicago, Director of Professional Relations for the American Hospital Association, was presented with a badge bearing the Coat of Arms of the Comite des Hopitaux du Quebec and a citation in recognition of his work in the hospital field. The Comite, which officially is the Committee of Catholic Hospitals of Quebec, met in the City of Quebec on June 23, 24 and 25, and was attended by about 3,000 persons.

Postgraduate Surgical Courses to be Presented in English by Vienna Academy of Medicine in Cooperation with the International College of Surgeons

(Medical Faculty of the University of Vienna)

In cooperation with the International College of Surgeons, the Vienna Academy of Medicine offers intensive courses in surgery. These courses are given throughout the year and usually begin on the first of each month. The opportunities for individual and special instruction in cadaver surgery in Vienna are exceptional. The curriculum pertaining to allied surgical subjects is very comprehensive. Postgraduates recommended by the International College of Surgeons will be given every possible consideration and attention. For further details, please apply to the "Journal."

General News Notes

Annual Meeting of Association of Military Surgeons of the United States: Reserve officers of the medical services of the Army, Navy and Air Force will be given complete information on all new directives, including pending Congressional legislation, governing their commissions, active duty requirements and retirement benefits, in one of the featured presentations of the 59th annual meeting of the Association of Military Surgeons which will be held at the Statler Hotel in Washington, D. C., November 17-19, under the presidency of Major General Harry G. Armstrong (F.I.C.S.Hon.), Surgeon General of the Air Force. Large delegations of foreign medical officers are expected to attend the meetings, besides some 2,000 Association members.

Scientists to Meet in December: The 119th meeting of the American Association for the Advancement of Science will be held in St. Louis, December 26-31, 1952. Hotel accommodations may be reserved through the AAAS Housing Bureau, Room 406, 911 Locust Street, St. Louis 1.

American Academy of Obstetrics and Gynecology to Hold First Clinical Session: The first annual Clinical Session of the American Academy of Obstetrics and Gynecology will be held December 15-17 at the Palmer House in Chicago. The meeting will feature six general sessions and 48 discussion groups of 40 Fellows each. The Academy was incorporated August 14, 1951, and already has some 2,400 qualified Fellows. Dr. Carl P. Huber of Indianapolis is the retiring president.

Fifth Neurosurgical South American Congress Announced: The Fifth Neurosurgical South American Congress will be held in Lima, Peru, April 13 to 21, 1953. Dr. Esteban D. Rocca is Secretary General. Other members of the executive committee are the treasurer, Dr. Alfredo Delgado N., and three secretaries, Drs. Juan Franco Ponce, Francisco Alayza, and Alejandro Saavedra.

Jewish Physicians Hold Congress: The second International Congress of Jewish Doctors was held in Jerusalem on August 10 to 14.

The World Medical Association: The Secretariat of the World Medical Association, United States Committee, has prepared a report of progress to organizations which are among its contributors, such as the International College of Surgeons. Organized in September, 1947, the Association now includes in its membership the national medical associations of forty-three countries and has applications pending from several others. Its chief aims are "to raise the standards of medical education and medical care, raise the level of public health throughout the world and speak for the practising medical and allied professions before other international bodies, such as the United Nations, which ordinarily receive only the opinions of governments."

Two of the recent activities along these lines are action in relation to the International Pharmacopoeia, and the drafting of a report on Social Security as it affects medical practice and the adoption of certain principles that affect the practice of medicine and the allied professions.

The Association is now sponsoring the First World Conference on Medical Education, to be held in London in August, 1953.

The Association has in mind assisting the underdeveloped areas of the world in raising their health standards, not through subsidization, but through teaching them modern medical technics with the use of the facilities they have or are likely to have. The program will be geared to assist industry; particular emphasis will be given preventive medicine and free enterprise.

Four important studies and survey reports have been published in the past five years, and eight other major studies are in progress. A Quarterly Bulletin has been started, and a Secretariat has been established in New York City. The Association has met in six general assemblies; the most recent was held in Athens, October 11-16, 1952.

American Medical Writers Meet: The ninth annual meeting of the American Medical Writers Association was held on October 1 at the Jefferson Hotel, St. Louis. The President of the Association is Dr. Akell M. Vaughn, F.I.C.S., of Chicago.

Blood Bank Association Holds Meeting: The Fifth Annual Meeting of the American Association of Blood Banks, held in Milwaukee, Wisconsin, October 9 to 11, 1952, attracted an attendance of more than 500, including those generally as well as those officially interested in the field from all parts of the United States, Italy, India, Puerto Rico and Germany. A feature of the meeting was a refresher course for technicians. Dr. Israel Davidsohn of Chicago was inducted as President of the Association for the ensuing year; Dr. Davidsohn is the immediate past-president of the American Society of Clinical Pathologists; Chairman of the department and professor of pathology, Chicago Medical School; Director, Department of Pathology, Mount Sinai Hospital; and Director of Research, Mount Sinai Medical Research Foundation.

Periodical Devotes Special Issue to Radiation Therapy: The November issue of the *Mississippi Valley Medical Journal and Radiologic Review* is the fifth annual "Radiation Therapy" number of that publication. This special issue is limited to original, practical papers on radiation therapy contributed by leading specialists. All papers were specially written to appeal to practicing physicians and surgeons.

Prospective Revision of Nomenclature of Human Anatomy: Pursuant to a resolution of the International Congress of Anatomy, a conference was held in London last May under the auspices of UNESCO to explore the possibility of an international revision of the nomenclature of human anatomy. It was unanimously agreed to bring the Basal Anatomical Nomenclature up to date by a conservative revision, making changes only where necessary for scientific correctness. Eight delegates participated, and the committee is in touch by correspondence with the Anatomical Society of Japan. Russian anatomists did not respond to an invitation to send a delegate. It is hoped that tentative lists of terms for each system of organs will be ready by December 1953, for editing and submission to the next international congress, to be held in France in August 1955. The secretary of the revision committee is T.B. Johnston, Guy's Hospital Medical School, London, S.E. 1. Interested persons in the United States and Canada may obtain further information from George W. Corner, Carnegie Embryological Laboratory, Wolfe and Madison Streets, Baltimore 5, Maryland.

Chest Physicians Announce 1953 Meeting: The American College of Chest Physicians will hold its nineteenth annual meeting at the Hotel New Yorker, New York City, May 28 to 31, 1953. Physicians who wish to present papers at the meeting should submit titles and abstracts to Dr. Arthur M. Olsen, Chairman, Committee on Scientific Program, American College of Chest Physicians, Mayo Clinic, Rochester, Minnesota.

Contest Announced for Proctology Papers: The International Academy of Proctology announces its annual contest for 1952-53. The best unpublished contribution on proctology or allied subjects will be awarded $100 and a certificate of merit. Certificates will also be awarded to physicians whose entries are deemed of unusual merit. The competition is open to all physicians in all countries, whether or not they are affiliated with the Academy. The formal award of the first prize and the presentation of other certificates will be made at the annual convention dinner of the Academy in May 1953. Entries are limited to 5,000 words. They must be typewritten in English and submitted in five copies, for receipt not later than April 1, 1953. Entries should be addressed to the International Academy of Proctology, 43-55 Kissena Boulevard, Flushing 55, New York. The Academy reserves the exclusive right to present all contributions in its official publication, *The American Journal of Proctology and Gastroenterology.*

New Books

A History of Neurological Surgery. Edited by A. Earl Walker, M.D. Williams & Wilkins Company, 1951. Pp. 583, with 153 illustrations.

This unusual monograph comprises a series of discussions devoted to modern cranial and intracranial surgical technics and procedures which, in most instances, have evolved from centuries of man's inquisitive and often ruthless explorations of the human cranium.

Perhaps the unusual quality of the work has been achieved in part by the chronologic progression of the development of a particular neurosurgical technic or procedure, so that the reader is permitted to survey the historic panorama of consistent advancement in this field.

Biographical sketches of such pioneers in neurosurgery as Harvey Cushing, Victor Horsley, Charles Frazier and many others offer the reader intriguing variety in addition to valuable information concerning the particular contribution of each to the progress of neurosurgery.

The reader is immediately impressed with the documentary material used by the contributors to this excellent work, though he may stand aghast at the surgical procedures, somewhat akin to modern technics, which were employed by so-called surgeons as far back as the ancient Greeks and Romans. In this connection, the historic custom or practice of trepanning effectively introduces the work through the prologue.

An extensive bibliography (124 pages) is given and includes many foreign references. Not to be omitted is recognition of the many excellently reproduced photographs and drawings which further enhance the material.

The reviewer is pleased to recommend such a masterful presentation to the neurosurgeon and to any other adult reader interested in certain phases of neurosurgery.

M. T.

Principles, Problems, and Practices of Anesthesia for Thoracic Surgery. By Henry K. Beecher. Springfield, Ill.: Charles C Thomas, Publisher, 1952. Pp. 65.

This monograph originally appeared as a contribution to *Archives of Surgery* for February 1951 (vol. 62). The experienced anesthetist will at once recognize it as a "must" in his reading, and perhaps also on his bookshelf. It is also destined to be perused and digested by many students. A reissue in such a handy separate form was thus a wisely considered step.

The author is Research Professor of Anesthesia at Harvard University, and Director of the Department of Anesthesiology at the Massachusetts General Hospital, Boston.

The choice of anesthetic is perhaps the most crucial topic, and on this question Beecher defends ether as against cyclopropane. He finds that the greater tolerance for either, the greater delay in fall of blood pressure, and the lower carbon dioxide tension more than balance the negative features of irritation and slower induction. Ether can be used with an abundance of oxygen, does not depress respiration, holds less danger of respiratory acidosis, and appears to have the lowest mortality rate. The preferred anesthesia may be induced with nitrous oxide-oxygen or thiopental sodium in the hospital room.

The author defends ether even for operations on tuberculous patients, holding that the objections advanced have no secure basis.

It may be added that he advocates nonvolatile agents only for cautery or diathermy, and rejects tribromoethanol. There are also brief discussions of local, spinal, and topical anesthesia.

Other considerations receive equally clear and concise treatment. At the outset, the author lists and describes the major hazards encountered in the lobectomy and pneumonectomy, with the therapy for each. Other sections deal with necessary equipment and various types of preanesthetic medication.

Sections on essential procedures during and at the end of operation, and special procedures for children, merit the most careful study. The author makes a special point of opposing routine bronchoscopic procedures at the end of the operation.

The final remarks deal with other transthoracic operations: cardiac and vascular interventions, thymectomy for myasthenia gravis, esophagectomy and gastrectomy, drainage of lung abscess, and thoracoplasty.

M. T.

Chest X-Ray Diagnosis. By Max Ritvo, M.D. Philadelphia: Lea and Febiger, 1951. Pp. 558, with 615 illustrations and 1 color plate.

This work is highly recommended to all surgeons, since roentgenologic data may be obtained long before the primary lesion of the affected organ becomes clinically manifest. A wealth of material is presented in a concise form and in an easy, readable manner. The work is notably free from padding.

Pathologic conditions that produce similar roentgen images are thoroughly discussed, with a view to avoiding mistakes in diagnosis. This particular part of the work is excellent.

In recent years many authors have advocated the "step-by-step" method of procedure. This has been followed in the present work. The illustrations are mainly roentgenographic images reproduced in positive rather than negative form and are of high photographic quality.

The mature experience of the author assures an authoritative text and sound clinical evaluation. The work is divided into ten sections: lungs; mediastinum; diaphragm; pleura; bony thorax and soft tissues of the chest wall; soft tissues of the neck; heart; aorta; pulmonary artery, and pericardium.

To the student as well as the specialist in every branch of medicine, this work is a valuable acquisition. The publishers have created a highly commendable work. Bibliography pertinent to a given section is found at the end of each chapter. The index is comprehensive. The paper and binding are excellent.

M. T.

Anesthesia for Thoracic Surgery. By Henry K. Beecher, M.D. Charles C Thomas, Publisher, Springfield, Ill.: Pp. 65.

This monograph consists of a plea for a simplification of anesthetic technics as applied to thoracic surgery. The knowledge from objective data obtained in laboratories and research centers can be applied by the average well-trained anesthetist in most hospitals without the use of any of the multitudes of "gadgets" described in the literature and available commercially. The practice of anesthesia, like other branches of medicine, is an art based on science. The human brain and hand are needed to evaluate the moment-to-moment response of the patient.

The essential equipment needed is described. Briefly treated are the types of anesthesia machines, the advantages and disadvantages of endotracheal tubes and cuffs, the difficulties of bronchial tamponade and controlled respiration, and the value of assisted respiration. The main emphasis is on lobectomy and pneumonectomy. The general principles are discussed as applicable to any type of operation necessitating an open thorax. The hazards developed in detail are management of the effect on secretions in the tracheobronchial tree, noxious vagal reflexes of respiratory and circulatory systems, hypoxia, causes and development of excess carbon dioxide tension, and circulatory strain.

In the section on choice of anesthetic technic and agent, the emphasis is on the physiologic and pharmacologic effects of the agent used in relation to the alterations in normal and abnormal physiology. Although the author has his own preference of agents, the reader, keeping in mind the disturbances involved in opening the thorax, may rely on his own intimate knowledge of those agents with which he is most familiar.

As the general problems are covered in the sections on pneumonectomy and lobectomy, only special aspects are treated in the discussion of other transthoracic operations (cardiac procedures, thymectomy, drainage of lung abscess, esophagectomy, and thoracoplasty and of the handling of children.

The value of this book lies in the restating of frequently neglected principles as applied to thoracic surgery. It is therefore a useful addition to the library of every person managing anesthesia in this field.

ANITA E. RAPAPORT, M.D.

Die Chirurgie des Dickdarms. By Prof. Dr. Hans Finsterer. Wien-Duesseldorf: Wilhelm Maudrich Verlag, 1952. Pp. 382, with 19 illustrations. (Vol. 7 of **Wiener Beitraege zur Chirurgie.** Ed. by Prof. Dr. Rudolf Demel.)

This new work on the colon is assured a warm welcome by surgeons throughout the scientific world. The authority of its distinguished author, who is Professor of Surgery at the University of Vienna, expresses itself in an essential scholarship, insight, and wide grasp of the problems of management in colonic surgery.

Of course, it is an additional source of pride to the International College of Surgeons

that such a work appears so opportunely from the pen of its newly elected President.

The author has termed his work a monograph, and one might agree, which is consistent with its length and concise treatment. Not aiming at encyclopedic completeness, he has chosen to emphasize the clinical approach, the symptomatology and diagnosis, omitting detailed descriptions of surgical procedures. Illustrations are accordingly reduced to a necessary minimum of drawings, roentgenograms, and histologic material. Many will agree that the author has thus chosen the most effective form for reporting his own conclusions from a lifetime devoted to abdominal surgery.

In another respect, however, the offering is somewhat more comprehensive than monographic. The practicing surgeon will recognize in it a valuable outline of surgical treatment, presenting in order the various types of operations, lesions, and diseases of the entire colon, from the appendix to the sigmoid flexure. Here one may find a discussion of surgical indications, rationale, results, and prognosis, in which the author has drawn liberally from personal experience to interpret and enrich his presentation of modern developments.

The early chapters discuss the various types of operation, with the indications for each. Separate chapters are given to enterostomies (including cecostomies, ileostomies, and colostomies), entero-anastomoses, exclusions, resections and total colectomy. Of particular interest is the discussion of the various types of anastomosis, including terminoterminal, laterolateral and terminolateral, aseptic anastomosis, and plastic surgery of the ileum, colon, and rectum. Subsequent chapters deal with occlusions, wounds, fistulas, inflammations, and diverticuloses.

Diseases of the colon are discussed in the final chapters. Included here are treatments of tuberculosis, syphilis, lymphogranulosis, actinomycosis, pseudo tumors and benign tumors, and finally the malignant varieties, including carcinoma and sarcoma.

The surgery of carcinoma is given perhaps the fullest discussion, with numerous case reports and an evaluation of the results in the author's clinics. As here reported, the total mortality in 248 interventions was 19.3 per cent. Of these, cancers of the ascending colon resulted in 17 deaths among 89 patients operated on once (19.1 per cent). Cancers of the descending colon resulted in 5 deaths among 50 patients operated on once, 3 deaths among 12 operated on twice, and 11 deaths in 69 operated on three times (15.9 per cent). A typical resections in 28 cases resulted in 12 deaths.

An excellent bibliography documents the case histories and also presents a valuable selection of the literature from earlier investigations to very recent ones.

The Photography of Patients, Including Discussions of Basic Photographic and Optical Principles. By H. Lou Gibson. Springfield, Ill.: Charles C Thomas, Publisher, 1952. Pp. 118, with 33 photographs (4 in color), diagrams, tables. (No. 95 of American Lecture Series: A Monograph in American Lectures in Medical Photography, edited by Ralph P. Creer.)

Good clinical photographs have by now amply proved their worth in clinical records, teaching and publications. Technics have kept up with the demand; indeed, the best results have been so excellent that the specialist in this field has carved out a niche of his own in the medical world. At the same time, creditable records are within the ability of the enterprising amateur.

This slim handbook has been written with the view of presenting the fundamentals for the medical practitioner, who may be an amateur photographer. The author, who is connected with the Medical Division of the Eastman Kodak Company, has given special thought to making it possible for the medical man to adapt the correct method to his own needs and use it with success.

Those who turn to these pages will find the technical side of photography in a digestible form, unlike some treatises which, though meritorious, are "padded." The principles are set forth systematically, and examples are especially chosen to reveal the difference between a creditable snapshot and an accurate record.

The *Photography of Patients* will also be welcomed by the professional, who will find discussions of finer points of technic, all the more valuable for their compact form. The tables of technical data will also serve as practical aids.

Special chapters are devoted to equipment and layout, close-ups with roll film, lenses, positioning and lighting, films and filters, printing, and papers. There is an appendix on color films.

M. T.

Les Syndromes Douloureux de la Région Epigastrique; Traité Clinique, Radiologique et Thérapeutique des Maladies du Tube Digestif. By René A. Gutmann. Paris: G. Doin et Cie., 1952. 2 vols. 1271 radiographs and anatomic plates, 411 diagrams. (Bibliothèque des Grands Syndromes. H. Roger, Dir.)

Those familiar with Dr. Gutmann's functions at La Salpêtrière in Paris have long realized that his treatise has a special significance for the abdominal surgeon. As physician attached to the surgical staff, he has enjoyed matchless opportunities for exploring and developing the relations between surgeon and consulting physician. His duties of examination, diagnosis, referral and follow-up, involving the closest collaboration with the surgeon in each case, have laid the groundwork for an outstanding contribution to semeiotics.

The outcome is the fifth edition now before us, an imposing monument of thirty years of diagnostic practice in gastroenterology.

On the appearance of the first edition in 1929, the late Alexandrin Gosset hailed it as unique among works of its kind in France, attacking as it did the diagnostic problem from the point of view of the symptoms and syndromes actually facing the examiner. He wrote that the plan followed in each part was to lead the reader from the most general symptoms, common to a given group of diseases, to more and more precise ones which permit the diagnosis of the exact variety.

This method of presentation has been retained throughout the revisions, enhanced and expanded from the author's wealth of personal experience.

In his introduction to this latest edition the author recounts his efforts to arrive at a statistical basis for his diagnostics. He concludes that statistical graphs and curves are misleading for the diagnostician. In defense of his own methods, he offers a "statistical" record of his own diagnoses and the surgical evidence that which supported them in most cases. This account underlines Dr. Gutmann's approach to the art of diagnosis: his concern with the concrete situation, and his reluctance to venture a misleading generality. Hence the painstaking concern with detail.

Another important emphasis (and one which is expected) is the correlation of clinical and radiologic diagnosis. Both are fully taken into account, and in an interesting note (vol. 1, p. 32) Dr. Gutmann has specifically replied to suggestions that he tends to slight the clinical examination. Though certain roentgen pictures may be pathognomonic, he states, "I have on every occasion affirmed that they clinical and radiological evidence) are inseparable . . . my diagnoses like my therapeutic decisions, are always clinico-radiologic."

Accordingly, the detailed clinical remarks are accompanied by exhaustive sets of over 1,000 roentgenograms. Unfortunately, in order to accommodate this large number, it was necessary to reduce the size of many of the plates; however, a number are clearly marked, to bring out important points. Illustrations in the text are limited to schematic line drawings.

Dr. Gutmann draws liberally both from his own experience and case reports, and from the world literature. His footnotes comprise an excellent selective bibliography on the subject, which would be even more useful with an index of the authors cited.

Finally, one must recognize that the careful organization of Dr. Gutmann's presentation is an especially strong point, characteristic of the best in French medical literature. This quality also makes it as useful for reference purposes as for study. A list of the chief headings must suffice to indicate the areas covered: (1) the symptom "epigastric pain" and its practical value for diagnosis; (2) the ulcer syndromes; (3) cancer syndromes; (4) gallbladder syndromes, hepatovesicular and choledochal syndromes; (5) perivisceral syndromes; (6) syndromes of pyloric and duodenal stenosis, pyloric insufficiency; (7) ptosis, mobile duodenum; (8) dyspeptic syndromes; (9) epigastric disorders of nervous origin; (10) gastritis, duodenitis, and hemorrhage of the digestive tract; (11) digestive disorders due to sensitization, digestive intolerance; (12) digestive disorders due to avitaminosis; (13) painful epigastric syndromes of the syphilitic patient; (14) painful epigastric syndromes of the tuberculous patient; (15) painful syndromes due to deformities of the stomach and diaphragm, and (16) late postoperative painful syndromes.

M. T.

Handleiding bij het Orthopaedisch Onderzoek Door. By G. Chapchal. Neederlande: Erven F. Bifleveld, 1952, 1st ed. Pp. 240, with 36 illustrations.

This guide to orthopedic examinations, written in clear and easily understood fashion, is a reflection of the author's long experience in teaching at the State University of Utrecht. It is of value not only to the younger orthopedic surgeon but to nurses and physical therapists who participate in the very important after-care of the patient.

The methods of examination are described in systematic fashion, enabling the reader to familiarize himself easily with a subject often neglected during the years of study in medical school. The contents are divided on an anatomic basis, each chapter dealing with a single joint or localized portion of the musculoskeletal apparatus. For still further facilitation of the use of the text, all chapters are subdivided as to inspection, palpation, joint aspiration, roentgen examination and function, with good descriptions of the normal conditions. The acompanying illustrations are in black and white and are both pertinent and interesting.

ALLAN B. HIRSCHTICK, M.D.

Surgical Gynecology, Including Important Obstetrical Operations. By J. P. Greenhill, M.D., Chicago: The Yearbook Publishers, Inc., 1952. Pp. 350, with 101 illustrations.

Greenhill is known among gynecologists throughout the world by his editorship of the Yearbook of Obstetrics and Gynecology and also through his previous publication on office gynecology and particularly well known to members of the International College of Surgeons, since he is Chairman of the Section on Gynecology and Obstetrics. The present book is a masterpiece in every respect. Its first part deals with the preoperative and postoperative care of gynecologic patients, and it takes into full account the results of modern research on antibiotics and on fluid and electrolyte balance, as well as on postoperative complications. These pages are the most concise description of a difficult subject that this reviewer has ever seen.

The second part is a systematic, step-by-step outline of gynecologic operations. Each procedure is profusely illustrated, and the author should be congratulated that he has been fortunate enough to obtain the artistic services of Miss Angela Bartenbach, whose excellent drawings add great value to the book. The text of the different operations is kept short, clear, and to the point, and all procedures with which a gynecologist or obstetrician may be confronted are described in a masterly manner. Dr. Greenhill chose, discussing those conditions for whose treatment different methods have been advocated in the literature, to present the ones which have proved in his hands, the easiest and quickest, without burdening the text with too many modifications. The chapter "Radical Panhysterectomy with Pelvic Node Dissection" is especially interesting.

The author mentions in the preface that this book was mainly intended as a guide for general surgeons or physicians in general practice who also perform operations. This is a very modest statement. In this reviewer's opinion, even the older gynecologist will be able to get quite a number of valuable points from this book, and it can be warmly recommended to anyone who performs gynecologic surgical procedures. The format is the good, print clear and the general make-up of the volume of excellent quality.

WERNER STEINBERG, M.D.

IX° Congresso
Colégio Internacional de Cirurgiões

Aviso Aos Membros do Colégio

A Comissão organizadora do IX Congresso do C.I.C. a realizar-se em São Paulo, Brasil, em 1954, por meio dêste faz saber a todos os interessados que é inteiramente inconveniente antecipar a data de 26 de abril-2 de maio, 1954, marcada para a sua realização, para a de fevereiro ou março de 1954, conforme solicitação de vários elementos do grupo norte-americano.

O IX Congresso do C.I.C. está sendo planejado para ser uma das mais brilhantes comemorações culturais do grupo dos festejos do IV Centenário de São Paulo, devendo atrair à capital do Estado de São Paulo cerca de 2.500 Congressistas.

O Governo de São Paulo, empenhado em que os festejos do IV Centenário constituam oportunidade para que nossos ilustres visitantes fiquem confortavelmente instalados, e possam ter a mais agradável permanencia em nossa capital, está estimulando a construção de 3 novos hotéis, que serão inaugurados justamente em abril de 1954.

Assim, pois, em fevereiro ou março, 1954, a situaçao para hospedagem em São Paulo para um grande grupo de Congressistas, é identica à atual, isto é, difícil e deficiente, sendo necessário espalhar os Congressistas em muitos pequenos hotéis, e sendo maior o grupo, alguns necessitando instalar-se em hotéis que não possuem condições mínimas de conforto.

Por outro lado, o Governo de São Paulo está providenciando para o ano de 1954 grandes empreendimentos, que tornarão o turismo ao nosso Estado muito mais agradável; assim, a segunda pista da aoto-estrada São Paulo-Santos, que abreviará a viagem, tornando o passeio mais seguro e agradável.

Assim também, a instalação de uma Feira Internacional de A mostras, no Parque Ibirapuera, que permitirá aos visitantes apreciar o desenvolvimento da indústria de todas as partes do mundo.

Assim também o governo de São Paulo está fazendo apressar as obras da cidade Universitária, em Butantã, e outras obras grandiosas, nas quais vários

grande s salões de conferencias serão feitos, para permitir lugares adequados à reuniões de grandes Assembléas.

Finalmente, a Comissão organizadora do IX Congresso do Colégio Internacional de Cirurgiões, desejando dar aos visitante uma oportunidade excepcional para verem floridas numerosas espécies brasileiras, entrou en entendimentos com sociedades de colecionadores de orquídeas, como o Círculo Paulista de Orquidófilos, para que eles desde já preparem suas plantas para florirem justamente em Abril, 1954.

A Comissão organizadora do IX Congresso, lastimando não poder atender ao pedido do simático grupo de congressistas norte-americanos, pelos motivos acima expostos, espera ter o prazer de recebê-los em São Paulo, cordialmente, em abril de 1954, desejando desde já que tenham os mesmos no Brasil uma estadia agradável, ao mesmo tempo que realizando um Congresso social e científico digno das credenciais do C.I.C.

Os temas oficiais escolhidos foram os seguintes:

1) Experiencias com a Socialização da Medicina nos diversos países.

2) Novas aquisições da Radiologia com contrastes nas várias especialidades cirurgicas): a) Neuro-Cirurgia b) Sistema cardio-vascular c) Endocrinologia d) Aparelho respiratório e) Aparelho Urinário f) Tubo digestivo g) Ortopedia h) Ginecologia.

3) Experiencia com o uso de antibioticos em todos os ramos da cirurgia: a) Neuro-Cirurgia b) Sistema cardio-vascular c) Aparelho respiratório d) Aparelho Urinário e) Tubo digestivo f) Ortopedia g) Ginecologia.

Ulteriormente, depois de esolhidos os relatores para os temas oficiais, e eleitos os convidados de honra, novos avisos serão feitos por intermédio do Journal, a todos os interessados.

Todos os que desejarem participar do IX Congresso Internacional em São Paulo, em abril de 1954, queiram com antecedencia escrever para o.

Prof. Dr. Carlos Gama.
Praça Ramos Azevedo, 209-70, andar
São Paulo, Brasil.

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Abstracts from Current Literature

Renal Lithiasis: A New Concept Concerning Etiology, Prevention and Treatment. Butt, A. J.; Hauser, E. A.; Seifter, J., and Perry, J. Q., South, M. J. 45:381, 1952.

Physicochemical studies of the urine, macroscopic, microscopic and ultramicroscopic, cause one to conclude that crystalline material may exist in a colloid state and vice versa. Colloids or material in a colloid state are aggregates of molecules. Their sizes are considered to range from 0.001 mu. to 1 mu. Because of the extreme minuteness of colloid particles, forces come into play that are negligible in greater dimensions.

Urine is a highly saturated solution of extremely complex composition. The unusual solubility of stone-forming salts depends on the presence of certain colloids that prevent precipitation of salts and other colloids. The protective action of urinary colloids is of major importance in preventing precipitation, agglomeration and conglomeration of crystalloids. If the concentration of such protective colloids is insufficient, the crystallin nuclei are "sensitized" and stone formation begins or is accelerated.

Six hundred and eighty patients were studied. Urine specimens were subjected to ultramicroscopic examination, determination of electrical charge carried by the colloid particles, determination of the surface tension, and photo-ultramicrographic studies. These studies revealed that the degree of protective colloid activity present in the urine was almost inversely proportional to the incidence of stones.

The concentration of ulltramicroscopically visible colloid particles in urine from Negroes greatly surpassed the concentration of such colloidal particles in white subjects. Of the 1,090,000 Negoes admitted to Johannesburg Hospital, none had renal lithiasis. At the same time, among the white population of South Africa, of 126,000 patients admitted, renal calculi were observed in the ratio of 1 to 460.

The urine of the female generally shows a higher concentration of colloid matter than does that of the male. In practically all statistical series the incidence of stones is significantly higher in male than in female patients. The amount of ultramicroscopically visible colloid matter in urine from pregnant women far exceeds the concentration of such colloid particles in that of nonpregnant women. This correlates well with an incidence of renal calculi complicating pregnancy in only 0.03 per cent.

The urine of the white female has a higher surface tension than that of the Negro female. Electrophoretic studies of noncentrifuged urine samples revealed that all urine showing low surface tension had been obtained from patients who are more or less immune to stone formation, as are Negroes. This seems to show clearly that the presence of capillary-active lyophilic colloids is responsible for this favorable condition. The presence of these capillary-active agents is a predominant factor in preventing stone formation from solid crystals of inorganic matter. This is due to their acting as protective colloids and dispersing agents that form a reversible gel in combination with the embryonal crystals of colloid size instead of the solid crystals of inorganic matter.

Colloids are of two types: the lyophobic colloids or suspensoid sols and the lyophilic ones. One of the chief characteristics of the lyophilic colloids is that they are little affected by low concentrations of electrolytes. There are two factors that maintain the stability of the lyophilic colloids, electric charges and hydration, and both have to be removed to bring about precipitation. If a lyophilic colloid is added in small amount to a lyophobic solution, it imparts to it an enhanced resistance to electrolytes, or "protects" it. Thus, these colloids are called "protective colloids." Most lyophilic colloids in the human body are "protective."

Not only was it observed that hyaluronidase was high in capillary activity, but when this substance was mixed with physiologic solution of sodium chloride and injected subcutaneously it acted appreciably to disperse minute particles suspended in the urine and prevented stone formation. This is due to the fact that naturally occurring protective colloids and physiologically increased amounts of protective colloids are set up to a gel, thereby preventing the electrolytes present from crystallizing.

Hyaluronidase probably acts by releasing hyaluronic acid at the site of injection, in this case the skin and subcutaneous tissue. The

weakened barrier begins to reconstitute itself shortly after the hyaluronidase action has been dissipated. During the period of repair, excessive hyaluronic acid or a substrate is present in the blood and is excreted in the urine. The effect of hyaluronidase in increasing protective urinary colloids is an indirect one, as the hyaluronic acid, or one of its released products, is excreted in the urine, thus acting as a protective colloid.

The first 9 patients selected for study had multiple bilateral rapidly renal calculi. Injection of 150 turbidity-reducing units of hyaluronidase was regulated individually by observing the duration of increased colloidal activity after injection of the drug, so that protective activity was maintained at an increased level. The patients were given hyaluronidase therapy for seven to eleven months. No new stone formation or growth of preexistent stones occurred while they were receiving this drug, and is shown by roentgenograms taken at intervals of thirty to sixty days.

Poor drainage is one of the greatest factors in maintaining infection and the consequent genesis and growth of stones. The effects of infection damage the epithelial lining of the urinary tract. This results in the appearance of large quantities of pathogenic colloidal material in the urine. There is increased agglutination of bacteria. Stasis induces fermentation of urea, leading to ammonium production, alkaline reaction and precipitation of certain electrolytes. Aside from nephritis, pus and exudates of bacterial origin are the most common sources of foreign colloids in the urine. Thus infection constitutes the commonest factor by which a normal protective mechanism is upset.

Formation of stones does not necessarily follow, as there are sufficient protective colloids present in the normal person to prevent the development of clinically significant stones. When pathologic colloids are being precipitated and agglutinated by infection, the protective colloidal mechanism normally present may be exhausted. The bacteria present may digest the colloid, thereby further decreasing some of the protective elements.

The hydrogen ion concentration of the urine is another highly important factor. When electrolytes react with alkaline substances in the urine, a "floc" is formed. This "floc" slowly sinks and carries a large part of the suspended solids with it. When the electrical potential is reduced to the isoelectric point, the particles precipitate and may form the nidus of a stone or may be added to a preexisting nucleus or calculus.

In some cases there is a relation between the formation of urinary calculi and a deficiency of Vitamin A. Vitamin A probably plays a part in a protective colloid mechanism, not only in the urinary tract but in the biliary tract, as both biliary and urinary calculi have been produced in animals maintained on a diet deficient in Vitamin A.

Randall's plaques occurring on the tip of the papilla may protrude through the surface of the epithelium, leaving a rough and irregular surface. This undoubtedly plays an important role in the development of certain renal calculi. Most persons have these microscopic calculi in their kidneys. It is probable that the calculi do not develop because of the protective colloids present in the urine, which prevent the growth of these microscopic particles.

H. J. ROSEVEAR, M.D.

Inefficient Uterine Action. Jeffcoate, T. N. A.; Baker, K., and Martin, R. H., Surg., Gynec. and Obst. 95:257, 1952.

Inefficiency of uterine action is rarely, if ever, due to overstretching of the uterine wall as in the presence of twins or hydramnios. Nor is it a characteristic of the worn-out and fibrous uterus of the *grande multipara*. Diseases of the uterine wall, such as fibroids, are not a significant cause.

The condition is essentially a disease of primigravidas. In at least 95 per cent of the severe form cases occurs in first labor.

The condition is often caused by or associated with a minor degree of disproportion and, in particular, with a posterior position of the occiput or a large fetus.

Primigravidas, it is generally said, are prone to incoordinate uterine action and inertia because they are fearful of an unknown experience. Fear, acting by the liberation of epinephrine or by the sympathetic nervous system, leads to tension in the lower uterine segment and the upper part of the cervix. Elimination of fear by antenatal education in the physiology of childbirth and in mental and physical relaxation ensures, it is said, smooth, rapid and less painful labor.

EDMUND LISSACK, M.D.

Carcinoma of the Stomach. Swynnerton, B. F., and Truelove, S. C., Brit.M.J. 1:4753, 1952.

This paper is a report of 375 patients with carcinoma of the stomach who were treated in Radcliffe Infirmary during the twelve years from 1938 to 1949 inclusive. The peak age incidence occurred in the sixties, and there were nearly twice as many men as women. The commonest site of the neoplasm was the prepyloric region, and the least common was the fundus. Nearly all the patients had symptoms referable to the gastrointestinal tract, particularly in the form of indigestion; half the patients had an epigastric mass. In 9 out of 10 patients an abnormality was reported by the radiologist at the first examination. Achlorhydria was a common observation, and most patients had occult blood in their stools. Sixty-three per cent of the patients were subjected to laparotomy.

Resection offers a prolongation of life. The outstanding factor influencing prognosis was the length of history prior to surgery. Oddly enough, the prognosis was found to improve with increased length of history.

W. A. CHIPMAN, M.D.

The Great Practical Significance of Auscultation of the Thyroid Body for the Diagnosis of Basedow's Disease (Grande Importancia Practica De La Auscultacion Del Cuerpo Piroides En El Diagnostico De La Enfermedad De Basedow). Camille, Lian C., Presse Med. 60:489, 1952.

When there is doubt about Basedow's disease, careful auscultation of the thyroid body and the surrounding structures is of practical interest and assistance. A continuous murmur, a strong and rough systolic blow or a slight and soft diastolic sound heard immediately below and inside the upper pole of the lateral lobe of the thyroid is quite diagnostic. This sign is known as Lian's and is defined as an upper continuous thyroid murmur. The sign may be present when clinical and biologic data are not conclusive. Lian considers it absolutely conclusive only when the continuous murmur presents its maximum intensity on the upper vascular thyroid pedicle. This sign is likewise significant in Basedow's disease, even when there is no murmur or only a slight systolic murmur at the base of the heart or in the subclavian arteries.

A second sign, described by the author a long time ago, is briefly mentioned as equally pathognomonic of Basedow's disease, especially when the disease is of recent onset. It consists of outlining an area of hyperesthesia to a needle prick which will be found to be confined almost exactly to the limits of the thyroid body.

Needle prick sensibility and auscultation are valuable means of diagnosis of Basedow's disease when other signs are not apparent.

S. A. Z.

Ectopic Pregnancy Inside the Uterine Wall in a Fibromatous Uterus. Achmatowicz, L., Lancet 2:63, 1952. Edmund Lissack, M.D. Dr. Achmatowicz explains this phenomenon as probably due to the possibility that the ovum, on its external migration after fertilization, became implanted on the posterior surface of the uterus, possibly where the epithelium had been damaged by fibromatosis or by dense adhesions. In the further course of its development the ovum burrowed into the uterine wall and, after nearly three months' growth, ruptured into the abdominal cavity.

EDMUND LISSACK, M.D.

Deformities of the Prepyloric Antrum of the Stomach from Extrinsic Origin (Deformaciones Del Antro Pilorico Del Estomago Debidas a Causas Extrinsecas). Albot, G., and Zerolo, J., Presse Med. 60:412, 1952.

Deformities of the prepyloric antrum brought on by extrinsic causes are of infrequent occurrence and are difficult to diagnose. The narrowness of the gastric lumen occurs a long time before a tumor may be palpated or seen.

False niches, false images simulating benign tumor, and false lacunar changes suggestive of perigastritis foreshadow primary or secondary ulcer defects. A few unusual and curious cases are presented, in which a polypous condition appeared but was found to be due to a bridle formation, lacunar deformity was due to cirrhotic varicose dilatations. The most reliable sign of extrinsic pressure was projection of the mucous membrane in parallel waves.

S. A. Z.

Disadvantages of Sphincter-Preserving Operations for Cancer of the Rectum. Lahey, F. H., J.A.M.A. 149:626, 1952.

This statement is a reiteration of Lahey's well-known uncompromising attitude toward sphincter-sparing operations for cancer of the rectum. Except as a palliative procedure in selected cases, his continuous and vast experience with this disease has served only to fortify his disapproval of operations smaller than the Miles abdominoperineal procedure with an abdominal colostomy.

The size of the lesion cannot be employed as an indicator of the extent of spread. Small lesions seemingly to the inexperienced, acceptable for sphincter-preservation, are not infrequently found to be highly anaplastic growths for which the most radical extirpation possible is the procedure of choice and of necessity.

Lahey is not convinced that the sphincter-saving procedures are satisfactory with respect to continence, for the preservation of which function such procedures have been recalled from obscurity into considerable recent prominence. He cites his own statistics and those of others with large and authoritative experience in the treatment of rectal cancer to point out the disadvantages and dangers of the lesser procedures. He predicts that sphincter-saving operations will prove detrimental to surgery of cancer of the rectum and that in time such operations will again find their limited usefulness for lesions far enough from the anus to make the procedures permissible and technically safe.

Already there has been almost universal abandonment of sphincter-preserving procedures for lesions below the level of the pelvic peritoneal reflection.

THOMAS WILENSKY, M.D.

Intraspinal Lesions Masquerading as Protruded Lumbar Intervertebral Disks. Craig, W. McK.; Svien, H. J.; Dodge, H. W. Jr., and Camp, J. D., J.A.M.A. 149:250, 1952.

This paper presents conclusions derived from the study of 1296 cases of exploratory operation at the Mayo Clinic for intraspinal lesions at or below the level of the tenth thoracic vertebra. Because the lumbar segments of the cord originate at the level of the tenth, eleventh and twelfth thoracic vertebrae, intraspinal lesions above the tenth thoracic segment were not considered in the differential diagnosis of the protruded lumbar intervertebral disk syndrome. Intraspinal tumors fall into three clinical groups: (1) intramedullary (those in the cord substance); (2) intradural and extramedullary; and (3) extradural.

The intramedullary tumors rarely produce radicular pain and usually present their own fairly characteristic picture. They are quite uncommon and do not present much difficulty in differentiation from protruded intervertebral disks. The tumors of the second and third groups are so situated in relation to the nerve roots that they can, in their early stages, before the symptoms of cord compression become evident, simulate those of the protruded lumbar disk. Night pain, thought to depend upon the lengthening vertebral axis in recumbency with consequent pulling on the involved nerve roots, is not uncommon in the presence of spinal cord tumors. Continuous pain not relieved by conservative treatment should arouse suspicion that a tumor and not a protruded disk is the cause. Similarly, persistent pain after operation for protruding disk should suggest the possibility of a tumor of the spinal cord.

Any disturbance of urinary or intestinal function, the presence of hyperactive reflexes, spasticity, muscular atrophy, and sensory aberrations demand careful consideration of the possibility of spinal cord tumor.

This comparative study reveals that there is a considerable overlapping of signs and symptoms of spinal cord tumors arising at or below the tenth thoracic vertebra with those of protruded lumbar disks.

In addition to the usual historical, neurologic, orthopedic and simple roentgenographic examination, the intraspinal investigation has been found essential and efficient for the detection and localization of intraspinal tumors.

Myelographic study with a contrast medium may be required as a final means of accurate localization. The concentration of protein in the cerebrospinal fluid has proved to be a valuable aid. In the experience of the authors, whenever more than 100 mg. of total protein per hundred cubic centimeters of cerebrospinal fluid was found, the lesion was considered a spinal cord tumor until proved otherwise.

THOMAS WILENSKY, M.D.

A Plausible Treatment of Rheumatoid Arthritis. Fowler, O. S., Rocky Mountain M. J. 949-952, 1951.

On the basis of his hypothesis that ptosis of the kidney and adrenal gland cause glandular dysfunction, the author proposes an adrenonephrocolopexy as a surgical curative procedure. The conditions claimed to be benefited by this surgical procedure are rheumatoid arthritis, Addison's disease, exophthalmic goiter, chronic abortion in young women, myasthenia gravis and the lesser asthenias, schizophrenia, Reynaud's and Buerger's disease, juvenile scoliosis, severe anemias, including the pernicious type, chronic stomach troubles, impotence and frigidity.

The marked clinical improvement claimed by the author for this surgical procedure is, in his opinion, correlated with the improvement in blood supply as well as with decreased strain on the nerve supply to the adrenal. Both the blood supply and nerve supply are altered as a result of ptosis, which so often occurs as a result of homo sapiens' assuming the erect position.

The use of ACTH and adrenal steroids is decried as merely substitutive therapy, whereas the operation proposed by the author is alleged to be curative.

During the operation the patient is placed upon his face. Both sides may be operated on at one sitting. The author performs the adrenonephrocolopexy on both sides in fifty minutes.

M. O. CANTOR, M.D.

Postpartum Hematomas. McNally, H. B., and Ehrlich, D.: Southern M. J. 45:708, 1952.

Postpartum hematomas have usually been considered the result of trauma secondary to (a) labor, (b) delivery or (c) operative manipulation during or immediately after delivery. They follow injury to a blood vessel without laceration of the covering tissues. They are of two types, the immediate and the delayed. The former may follow either spontaneous or operative delivery; the latter may follow the sloughing of a vessel, usually a vein, that has undergone pressure necrosis.

The treatment of postpartum hematomas of the birth canal begins with early recognition. Evacuation of clots and accumulated blood is followed by ligation of the offending vessel if found. The cavity should be packed loosely with hemostatic absorbable sponges and the vagina packed tightly with ordinary gauze. Prophylactic antibiotics will be needed, and transfusion may be required.

Factors which do not influence this condition are the age of the patient, the type of delivery, anesthesia, the size of the baby, toxemia, varicosities and blood dyscrasia. The predisposing factors are primiparity, prolonged labor, failure to perform an episiotomy and faulty repair of a tear or an episiotomy.

EDMUND LISSACK, M.D.

Cataract Extraction after Glaucoma Surgery. Callahan, A.: Arch. Ophth. 47:132-140, 1952.

Dr. Callahan gives illustrations of an inferolateral corneal section for cataract extraction after operation for glaucoma. In his opinion this offers less probability of interference with the antiglaucoma operation. In only 2 of the 15 cases reported was a surgical procedure required to control glaucoma after the cataract extraction. In 4 of the eyes corneal scarring necessitated iridotomy on the opposite side to allow vision through a clear area of the cornea.

CLAUDE M. WARREN, JR., M.D.

Closed Fossa Tonsillectomy. Emerson, E. B., Jr.: J.A.M.A. 1:348, 1952.

This method of closing a tonsil wound, an otherwise dead space, involves absolute removal of all tonsillar tissue, as a buried tag of tonsil is most likely to result in a serious focus of infection. Interrupted sutures begin at the junction of the posterior pillar and fossa proper, passing just beneath the vessels and emerging at the junction of the anterior pillar and the floor of the fossa.

The method is far superior to the old tonsil operation, in that no hemorrhages occur unless through some accident the stitches are torn out. This happened in only 2 of 634 operations performed by the author. The voice is not affected, no pulmonary complications should occur, the patient suffers much less pain and healing is greatly facilitated.

It must be realized that this procedure requires more time at the operating table, and one might say that it thus endangers life. As the surgeon improves his technic the time consumed will be only a few minutes longer than the older method requires. The sutures will prevent secondary hemorrhages, which often require a second induction of anesthetics.

CLAUDE M. WARREN, JR., M.D.

In Memoriam

OSWALD O. COOPER

M.D., F.A.C.S., F.I.C.S.

At the age of 85, Dr. Oswald O. Cooper of Feather Falls, California, died on July 24, 1952. Before his retirement to California, Dr. Cooper was surgeon for the Chesapeake and Ohio Railway and was a member of the staff of the Hinton Hospital at Hinton, West Virginia, and an instructor in the nursing school of that hospital.

Dr. Cooper was born in Spanishburg, West Virginia, received his preliminary education in the public schools of Hinton, and graduated with a B.S. degree from National Normal University in Lebanon, Ohio, in 1886, and an A.B. degree from the same school in 1887. He received his M.D. degree from Bellevue Hospital Medical College, now a department of New York University, in 1890. He served a two-year internship at Bellevue Hospital in New York and did postgraduate work in operative surgery at Polyclinic Hospital and Postgraduate Hospital in New York; with Doctors Murphy, Ochsner and Bevan in Chicago; Kelly and Halstead at John Hopkins; Cushing, Richardson and Cabot at Boston; Babcock, Deaver and DaCosta in Philadelphia; Kocher in Berne; Sauerbruch in Zurich; and with various other great masters of surgery in Munich, Berlin, Vienna, Paris, London, Moscow, and the Mayo Clinic.

Contributions to the surgical literature made by Dr. Cooper were mostly in the fields of traumatic surgery with particular reference to amputations, spinal anesthesia, and surgery of the spleen. He was a life member of the West Virginia State Medical Association and of the American College of Surgeons and was a qualified Fellow of the International College of Surgeons.

KYLE CORNETT COPENHAVER

M.D., F.I.C.S.

Dr. Kyle Cornett Kopenhaver of Knoxville, Tennessee, died on September 15, 1952, at the age of 66. He was on the surgical staff of the Acuff Clinic; member of the executive committee of the staff of Knoxville General Hospital and Fort Sanders Hospital; chief of gynecology at the former hospital; and a member of the visiting surgeons' staff of St. Mary's Hospital.

Dr. Kopenhaver received his M.D. degree from the Medical Department of the University of Tennessee in 1912. He did postgraduate work at the University of Pennsylvania in 1917 and New York Postgraduate School in 1920. He was a past president of the Knoxville Academy of Medicine and of the Tennessee State Medical Association, and a Fellow of the American Medical Association, the Southeastern Surgical Congress, and the International College of Surgeons.

COLIN CAMPBELL VARDON

M.D., F.A.C.S., F.I.C.S.

Dr. Colin Campbell Vardon of Detroit, senior surgeon at Highland Park General Hospital, Highland Park, Michigan, died recently at the age of 66. Dr. Vardon received his medical degree from Wayne University. During World War I he served for two and a half years as First Lieutenant in an A.E.F. Field Hospital. He was a Qualified Fellow of the International College of Surgeons.

GEORGE I. MILLER

M.D., F.I.C.S.

Dr. George I. Miller of Brooklyn, New York died on July 28, 1952, at the age of 81 years. He was instructor in operative surgery at Postgraduate Medical College, New York, and surgeon-in-chief of Unity Hospital, Brooklyn, of which he was one of the founders.

Dr. Miller was born in Koenigsberg, Germany. He received his medical degree from New York University in 1896 and served his internship at Beth Israel Hospital, New York. He was the inventor of the Miller direct blood transfusion apparatus. He became a Fellow of the International College of Surgeons in 1937. He was a graduate in law but never practiced that profession.

EMLYN RICHARD MARKER

M.D., A.I.C.S.

On September 30 word was received from Dr. Emlyn Richard Marker of Toledo, Ohio, that he would appear before the Conference Committee on October 6 in connection with his application for advancement to Qualified Fellowship. A few days later word was received of his death on October 4, at the age of 51.

Dr. Marker was a graduate in pre-medicine of Ohio State University and received his medical degree from the medical school of the same university in 1923. He served his internship in Toledo Hospital in 1923 and 1924 and did postgraduate work at the University of Michigan, the Mayo Clinic, and the Crile Clinic. He was a member of the surgical staffs of Toledo and St. Luke's hospitals since 1929 and was Director of Surgery at the latter hospital from 1948 to the time of his death.

Associate membership in the International College of Surgeons was conferred upon Dr. Marker in 1947.

LOUIS TOMPKINS WRIGHT

M.D., D.Sc. (HON.), F.A.C.S. F.I.C.S. (HON.)

The first Negro doctor to serve in a New York hospital, and one of the first to serve with the armed forces—Dr. Louis T. Wright of New York—died on October 9, 1952, of coronary thrombosis at the age of 61. Dr. Wright has been called the most outstanding Negro physician in the world.

Dr. Wright was born in Lagrange, Georgia. He was graduated from Clark University in Atlanta in 1911. In 1915 he received his medical degree *cum laude* from Harvard Medical School. In 1917 he joined the American Expeditionary Forces in France as a first lieutenant and was in charge of surgery in Triage Hospital 366—92nd Division, A.E.F. He was awarded the Purple Heart. He was discharged with the rank of Captain in the Medical Corps. He joined the Medical Reserve Corps, became a major and later lieutenant colonel as a result of promotion in examination.

Dr. Wright joined the Harlem Hospital surgical staff after his release from active duty and at the time of his death was President of the Medical Board and Director of Surgery of the hospital. In 1932 he became the first Negro appointed a police surgeon in New York City. In 1938 Clark University conferred upon him an honorary Doctor of Science degree. Last April 30 a special testimonial dinner was given for him at the Statler Hotel by American medical and cultural leaders including Mrs. Eleanor Roosevelt, Dr. Channing Tobias, delegate to the United Nations General Assembly, and Mayor Vincent R. Impellitteri; the affair was the kickoff for a Louis T. Wright Medical Library at Harlem Hospital.

Honorary Fellowship in the International College of Surgeons was conferred upon Dr. Wright in 1950. He was a Fellow of the American College of Surgeons and a diplomat of the American Board of Surgery. He was chairman of the board of the National Association for the Advancement of Colored People.

NORMAN CHARLES OCHSENHIRT

M.S., M.D., F.A.C.S., F.I.C.S.

The death of Dr. Norman Charles Ochsenhirt of Pittsburgh on July 25 has been reported. Dr. Ochsenhirt was 59 year of age and has been on the surgical staff of Suburban General Hospital in Bethlehem since 1928 and on that of Presbyterian Hospital, Pittsburgh, since 1929. For the past fourteen years he had also been on the surgical staff of Montefiore Hospital, Pittsburgh.

Dr. Ochsenhirt graduated from the University of Pittsburgh with a B.S. degree in pre-medicine in 1917, and received his medical degree from the University of Pittsburgh School of Medicine in 1917. Ten years later the degree of Master of Science in Surgery was conferred upon him by the Mayo Foundation Graduate School of the University of Minnesota. His internship was served at Allegheny General Hospital in Pittsburgh in 1917-18. His teaching appointments included two professorships—Professor of Maxillofacial Surgery and Professor of General Pathology at the University of Pittsburgh Dental School.

Dr. Ochsenhirt was a Fellow of the American College of Surgeons and in 1946 was admitted to Fellowship in the International College of Surgeons.

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